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Prevention of Blindness from the Ophthalmologist's Point of View*

Ellice M. Alger, M.D.

A HISTORY of the sight conservation movement from ancient times to the present day, told from the medical and sociological viewpoints

Attitude of Ancients toward Blindness

Few people stop to think how recent the movement for prevention of blindness really is. Blindness itself is, of course, no new problem, for the blind have appealed to the pity and the charity of the sighted from the most ancient times. It must have been common enough even then. Accidents and the injuries of war where battles were all settled in hand-to-hand conflict took care of that. The ancients, too, must have had much the same list of diseases and infections that we know today. Hippocrates, three thousand years ago, prescribed a treatment for trachoma that in some respects resembled our own. There have been, too, from the earliest times physicians who, more or less, specialized in diseases of the eye; who had all sorts of lotions reputed to be useful to ailing eyes; and who indulged in all sorts of speculation about the nature of sight and the morbid processes of their patients. They did a good many operations with considerable success, such as couching for cataract, and operations for deformities of the lids and the like. There was some practical prevention of blindness too. The men who first put visors on helmets or learned to protect the eyes from the glare of the sun on ice and sand by slotted bits of wood were real benefactors.

*Speech delivered on the occasion of the presentation of the Leslie Dana Gold Medal to Dr. Alger, at the 1938 annual meeting of the National Society for the Prevention of Blindness.

But on the whole the ancients considered blindness a terrible individual misfortune, which could be treated and sometimes cured, and it never occurred to anyone to try to prevent it on any large scale. Life was too cheap and suffering too universal.

All through the middle ages little advance was made. Galen was still the medical authority of the time, but his reputation was so great that it was considered almost impious to question his dicta or try to improve on his methods. His writing rested like a dead hand on medieval medicine for a thousand years and little progress was made.

New Problems in the Nineteenth Century

Even a hundred years ago the situation was not so very different. The scope of blindness had increased considerably, for the duration of life was getting longer and longer, and there were more and more of the degenerative and senile changes that had not been recognized in earlier times. The modern industrial era, too, was well on its way, with its great increase in near work and strain and its new types of accidents and disease.

A few physicians knew considerably more about the eyes than their predecessors, but their services were reserved entirely for the well-to-do. They no longer couched cataracts but extracted them as best they could without either local or general anesthetics. The distinguishing characteristic of the great surgeon was emphatically speed.

Glasses had been in use for a long time and were no longer handed down from one generation to another as precious heirlooms, but it was considered beneath the dignity of the physician to fit them and they were practically self-selected. They were used entirely to improve vision either far or near. The correction of eyestrain was yet to come.

The practice of the specialist up to, let us say, the time of our Civil War, was almost entirely confined to external eye diseases. He could see the conjunctival infections, or corneal ulcers, or mature cataracts readily enough, but as yet no one had ever looked at the inside of the living eye and recognized beginning cataract or chronic glaucoma or optic atrophy or retinal hemorrhage.

The old textbooks abound in words like amblyopia and amau-

rosis, which meant a blindness of the eye without any obvious cause, and the early specialists were almost all general surgeons who had gradually limited their work to the eye, or at least to the eye and ear, nose and throat.

Early Steps in Prevention

Vaccination Against Smallpox.—But some steps had already been unwittingly made in the prevention of blindness. There was a time when practically everyone had smallpox, either mild or severe, and many patients developed corneal ulcers and lost one eye or both. Probably a quarter of the blind owed their misfortune to this cause. The introduction of vaccination against smallpox, which was done without the slightest idea of preventing blindness, nevertheless practically abolished one of the great causes of blindness. Most of the great advances in medical science have been useful to ophthalmology in the same way.

Establishment of Charity Eye Hospital in London.—Moorfields, the first great London charity eye hospital, was founded in 1805, and since that time similar charities have spread all over the world. They marked the first attempt in history to give medical help to the eyes of the poor and unfortunate. Each one of them has become not only a center of help for patients, but of indispensable training for physicians both young and old. They have been among the greatest and most direct efforts at the prevention of blindness. Today we have them scattered all over the United States. But we are still far from having enough of them to put the achievements of medical science within reach of the great majority of our people.

Advances in Medical Science.—But suddenly in the middle of the last century things began to happen in the world of science that pushed the frontiers of medicine, including ophthalmology, further forward in 25 years than it had progressed in all recorded time.

Pasteur, who was a chemist and not a physician, developed bacteriology, which revealed the causes of many hitherto mysterious diseases. All we know of antisepsis, asepsis, immunity, antitoxin, and vaccines, which are the foundation of modern medicine and surgery, stems back to him and his disciples. He was one of the great men of all times.

Neisser discovered the gonococcus, and Credé found that, by putting a few drops of weak silver solution into the eyes of the newborn, he could practically abolish ophthalmia neonatorum and with it some 25 per cent of blindness.

Virchow, with his cellular pathology, taught us how to examine tissues with the microscope, and study the processes of disease and death which might mean prevention and cure in the days to come.

Morton and Simpson gave us ether and chloroform and abolished the agonies of surgery and obstetrics.

Carl Koller, who practices among us today, discovered cocaine, which, with its substitutes, has made possible a deliberate and unhurried operative technique and enormously broadened the field of ophthalmic surgery. Most modern eye operations could not be done without it. Few men have ever made a greater contribution to humanity.

Invention of the Ophthalmoscope.—Helmholtz invented the ophthalmoscope and so made it possible to see the interior of the living eye, which no man had ever seen before. It was now possible to study what was happening in cataract, glaucoma, brain tumor, optic atrophy, and a host of other anomalies. It was the greatest forward step ever made in ophthalmology. It made diagnosis possible, which is the foundation of all intelligent treatment. It linked ophthalmology again with general medicine from which it had tended to become separated.

It is interesting to note here that an English layman, five years before von Helmholtz' time, devised a much better ophthalmoscope but did nothing with it because the leading London ophthalmologist, the greatest surgeon of his time, could not see that it would be of any particular use. It is hard to believe that a really great man could be so devoid of imagination, and that progress could thus be delayed.

Donders systematized the refraction of the eye and made it possible for the patient to have his glasses fitted intelligently instead of practically selecting his own. Later on it logically followed that glasses could not only improve vision and help the blind to see, but relieve strain and give relief to thousands who thought there was nothing the matter with their eyes because their vision was so

keen. Incidentally, the ophthalmologist finally convinced himself that the fitting of glasses was not beneath his dignity.

George Gould popularized the idea that eyestrain was not only bad for the eyes themselves, but was a potent cause of ills like headache, nausea, vertigo, and many nervous conditions.

Stevens discovered anew the ocular muscles and their function. He devised a terminology which has not been improved upon to this day, and made possible the elimination of another great cause of strain.

Improvements in Illumination

Vast improvements have been made in illumination. Candles, whale oil lamps, kerosene, and gas had their day, or rather their night, before Edison invented the incandescent electric light. Since that time the illuminating engineer has developed improvements in lighting in the school, the office, and the factory which seem to leave little to be desired but which, nevertheless, are being constantly advanced.

Gullstrand invented the slit lamp and made possible the microscopic examination of the living eye.

Changes in Ophthalmic Lenses

Neither must we forget what we owe to the generations of experts who have steadily improved ophthalmic lenses. They are now susceptible to mass production and are within the reach of the poorest. The last of these is the contact glass, which slips under the lids like a glass eye. It is practically invisible, and it makes an almost miraculous improvement in vision in certain types of disease. It abolishes our greatest refractive defect, corneal astigmatism. Unfortunately, it is still very expensive.

As each forward step in science leads logically to another, so the constant flow of ophthalmological discoveries keeps opening the way for others which are new and interesting and useful. From time to time we may expect some of them to be revolutionary and important. We are still seeing new vistas from insulin, vitamins, endocrines, and filtrable viruses.

All these new improvements in diagnosis and treatment clearly showed that the sight of a great many blind people might have

easily been saved if taken in time and a movement for the prevention of blindness begun among the ophthalmologists.

Ernst Fuchs—Pioneer in Prevention

A young, relatively unknown Austrian ophthalmologist presented in 1885 a prize essay calling attention to the amount of blindness that could easily be prevented and making a strong plea to his colleagues to take up the work. It was afterward published in book form, and aroused much interest among them. This man was Ernst Fuchs, who was to become one of the world's most famous ophthalmologists, and who, during a long and successful career, never lost sight of this phase of his work. It is interesting to note that in his old age and after the financial ruin that followed the inflation of the Austrian mark he spent much time with his colleagues here in America, and among other marks of esteem was granted this same Leslie Dana Gold Medal.

The first organizations both here and abroad consisted almost entirely of ophthalmologists and were generally both short-lived and inefficient. They met annually or semi-annually, had no facilities for raising money, and their work consisted almost entirely of the reading and circulation of technical papers with some popular lectures. Every one of us has belonged to groups of this kind, and while the work was fundamental and of high character, its practical value was quite limited.

Sociological Aspects of Prevention

Economic Arguments.—But since that time a new social theory has developed, the effects of which can hardly be overstated. There is a rapidly growing conviction that the individual is a mere unit in a great social organization. If he dies in childhood, he has cost his parents and society a fairly definite sum, which death has deprived him of the opportunity to repay. Every such death is a total loss. If he grows up, his value is estimated in the same way. If he creates more than he consumes, he is an asset. If he consumes more than he creates, he is an actual liability, since modern society no longer allows him to perish miserably of neglect but collectively assumes the responsibility for his comfort and his care. Society

therefore has a direct interest in the health of each of its units, because ill health not only increases cost but lessens productivity.

There are said to be 120,000 blind people in the United States who make a profound claim upon the pity and the charity of their neighbors. They have through often unnecessary blindness become social liabilities instead of assets. In addition there are millions of people who are not blind or likely to be blind in the ordinary sense of the word, but who make their living by their eyes, and who fail to realize anything like their full efficiency by reason of defects in their eyes, or in the conditions under which they work. The suffering and the economic loss from inefficient eyes is beyond all calculation. The prevention of blindness has therefore tended to widen more and more into the conservation of vision.

Work of Welfare Agencies.—In addition the general public had become very much interested in its own health. This was plainly evident in the patent medicine era. As this fell into disfavor because of its obvious dishonesty, its place was taken by more legitimate forms of health propaganda.

Numerous groups formed among those with similar interest. The anti-tuberculosis movement, the Red Cross, and the various organizations interested in public health nursing and teaching are cases in point. And there are innumerable other groups whose interest reaches from mental hygiene to sex information and birth control. Every one of us belongs to some of them. Books on all sorts of health topics have become best sellers. The newspapers have health columns and report the proceedings of the important medical meetings. The radio features health and its care. A child going blind from glioma becomes suddenly a headline item.

A significant feature of the movement is that it has developed a large class of paid, full-time social workers. Their motives are beyond suspicion, their minds are ever on the alert, and they have built up a profound social influence. State and national political organizations have been quick to utilize their knowledge and their good will in organizing the great pressure groups behind socialized medicine, public health and social security. They form a sort of social fly-wheel which keeps the whole movement going evenly and steadily.

Achievements in Prevention of Blindness

Organizations for the prevention of blindness were among the earliest and most active of these societies, of which the National Society for the Prevention of Blindness is the largest and most influential. It was definitely organized as a lay society under the guidance and advice of ophthalmologists and such other experts as seemed necessary. Its policy was well expressed in the phrase, "Nothing that concerns the saving of sight is a matter of indifference to us." During its 30 years of existence it has had a remarkable growth and an international influence, of which this is not the time nor place to speak in detail.

The passage of time has abolished many of the once common causes of blindness. We have already alluded to smallpox. The treatment of diabetes with insulin has prevented, or at least postponed, ocular manifestations which were once much more common.

Early Emphasis on Ophthalmia Neonatorum.—When this Society was first formed, its interest was largely centered on ophthalmia neonatorum, an inflammation which occurred frequently in the eyes of the newborn children. With the methods of treatment then in vogue the results were appalling and it was estimated that nearly half the children in the schools for the blind owed their disability to this cause.

Twenty-five years before this Credé had taught that a few drops of nitrate of silver solution instilled at the time of birth would practically abolish the disease, but the drops were not used and the blindness went on. Today the combination of legal compulsion and public education, in which this Society had a large part, has practically abolished the disease, while in the few cases that do occur the methods of treatment have been so improved that little damage is done. But the drops must be made a routine part of every childbirth or we shall have sporadic cases and deplorable results.

Decrease in Industrial Blindness.—The cheap wood alcohol which was the cause of many spectacular cases of sudden and complete blindness was another of the Society's great concerns; today the entire output is used in the film industry, and blindness from drinking is practically never seen.

Industrial accidents and poisonings which were once common

have become rarer and rarer, because of the strict supervision now exercised over industrial processes. The spectacular removal of large foreign bodies from the eye with the giant magnet is rarely seen today. The workman who does not carry out the precautions directed by the industrial engineer and the insurance inspector loses his job without debate. Even the accidents of play and those associated with the Fourth of July have been materially reduced.

Practical Elimination of Trachoma.—At that time trachoma was one of our great problems. New York City was full of immigrants who had brought this contagion from the old countries and were spreading it in the new. Our public schools were full of children who had a kind of pseudo-trachoma over which health authorities got very much excited. There were special clinics and special hospitals for trachoma, and the bi-weekly rubbing the lids with copper sulphate was a major source of ophthalmological income. Today, owing largely to efficient health measures and the general improvement in the standard of living, we can hardly find cases enough to demonstrate to our students. In certain sections of the Midwest and the South, however, and among our Indian wards, it is still a major problem; while the lowering of nutritional and sanitary standards after the war have brought it back again in many parts of Europe and Asia. In Egypt and Palestine 85 per cent of the population are more or less blind from it.

Present-Day Problems

Syphilis as a Cause of Blindness.—We have practically abolished smallpox. The next great cause of blindness to go is apparently the age-old great pox, or syphilis. More than 25 years ago Schaudinn identified the spirochete which caused it. Wassermann and his disciples devised a very certain method of diagnosis, and Ehrlich gave us the arsenical therapy which has so lessened the dangers of infection and increased the possibilities of cure. But until the last few years the word syphilis could not be printed in the public press or spoken over the radio. Today a great popular approval sanctions laws calling for compulsory reporting and treatment and for blood tests before marriage and in pregnancy. Methods of diagnosis and treatment have so improved that it is practically possible to guarantee a healthy child even though its parents be

diseased. The various methods of heat therapy have vastly increased our control of chronic syphilis among adults.

Hereditary Causes.—But blindness will never disappear entirely. We may conquer ophthalmia in the newborn, but there still remain the various forms of hereditary blindness. As interstitial keratitis disappears among our children, we see crowding up the regiment of the cross-eyed, whose eyes we are no longer content to straighten merely for appearance sake. They now must have their amblyopia cured and their fusion trained so that they may have binocular vision like the rest of us, and this is no small matter.

Improvements in Operative Techniques.—We see many detachments of the retina, which we used to advise our patients to charge up to profit and loss, so hopeless did they seem. Today a high percentage of them can be cured, if discovered early, by methods of operation which seem to get simpler and simpler, but more and more effective. We have seen the successful implantation of human corneal grafts restore sight in some of those miserable children whose white, staring eyes have hitherto been beyond our greatest skill. But this is as yet no field for the occasional operator. The problem is not to get the graft to live but to have it remain transparent, and only a very few men can report consistent good results. Today there is an increasing number of children with progressing myopia. We place them in sight-saving classes whose teachers this Society has had a major part in training, where they get the same education as other children. Meantime the progress of the disease is retarded until, in their early twenties, the myopia tends to become stationary.

Increasing Proportion of Old People.—The time was when the old people in every community were a small minority of its population. Today they are approaching a majority, while their support and their employment constitute one of our great social problems. Among them we have a corresponding increase in the blindness that results from high blood pressure, and the senile and vascular diseases, where early discovery may mean not only the prevention of blindness but the prolongation of life itself.

We shall see more and more cataracts. We now know that the average cataract exists for a good many years before it actually begins to interfere with sight, and we have faith that better

knowledge will sometime show us how to retard it or even prevent it entirely. Meantime there is hardly any surgical condition that offers such a good prognosis in competent hands.

We shall see more and more of the senile changes in the retina and the optic nerve, and we shall have a higher percentage of the functional conditions which are often far harder to detect and treat.

We shall see more and more of the various forms of glaucoma, that dangerous hardening of the eyeball which is so difficult to recognize in its beginning and so destructive to sight when neglected. We have many more facilities for its diagnosis than our fathers had; and our therapeutic and surgical measures are much better. Nevertheless, the disease is often overlooked or neglected and our treatment still leaves much to be desired. We know how it occurs but as yet can only guess at its why.

Responsibilities of the Medical Profession

Our first great need in all these conditions is early diagnosis and for this we are inadequately prepared. It is just as desirable to have an occasional competent examination of the eyes as of the heart and lungs or the kidneys, particularly as one grows older. There are not enough ophthalmologists in the country to do a fraction of this work. They are the only men trained to recognize disease when they see it, but their education is becoming so prolonged and so expensive that no small city can give them adequate opportunity or support. We must do everything we can to increase the opportunities of the small town ophthalmologist who very often doubles in ear, nose and throat. He is being encouraged to do post-graduate work, to attend clinics at the great hospitals, to join special societies, to subscribe to special journals, and so keep alive his interest in one of the most engrossing branches of medicine. Particularly he must know the limits within which he is competent to work, and not try to extend them too fast.

We are endeavoring to weed out the inexperienced and the incompetent by practical examinations given only to those who have had several years of training. The day is almost past when the simple degree of doctor of medicine authorizes a man to dabble in any of its branches.

We are endeavoring to train nurses, technicians, and social

service workers who can function competently under the supervision of the ophthalmologist and so lighten his labors and extend his field.

But practically half our people never have their eyes examined except by an optometrist. In one way or another we must increase his training and give him a professional point of view, so that without necessarily being able to make accurate diagnoses or being allowed to treat actual disease he may be able to note abnormalities and secure competent help.

The second great need is adequate treatment, whether medical or surgical, for the ills that have been discovered. Here we are even worse off. In the large cities it is possible for one who knows how to secure adequate diagnosis and treatment whether he be rich or poor. In the small towns and in the country roughly half our population live in a fool's paradise so far as their eyes are concerned. There is no one who can tell them with any authority whether or not their eyes are healthy. There is no one who can prescribe intelligently for them, and there is no place where they can secure the emergency treatment for ocular illness or accident which may at any time occur.

These are indeed serious and perplexing problems. Until we can make available for all our people the diagnostic and therapeutic skill which our better ophthalmologists are able to offer, these problems are only half solved.

Senile Cataract

Purman Dorman, M.D.

IN simple and vivid language the author describes the development of cataract, and indicates methods of treatment

Importance of Sight

It is probable that only the blind and the physicians to the blind realize what a major part in human life is played by sight. Half our world is what we see. Except for music, the arts are visual—for the major portion of good poetry consists in "images," mental pictures of what we have actually seen previously, while fiction rests upon descriptions of what the dramatis personae do, thus calling upon visual memory for their most moving effects. Science in a sense is but the refinement of sight through the instrumentality of microscopes, telescopes, and cameras. To what extent our everyday life depends upon sight only those who have been blinded can begin to realize. The physician who gives sight back to a man or woman returns to that person much of the world, brings back much of the beauties of life itself.

Incidence of Cataract

Almost a third of the people over sixty years of age who are totally blind are so because of cataracts. The movements and colors of life have been curtained by the opacity of a tiny bit of tissue, the lens within the eyeball. Cataracts have been known as far back as history is recorded. The word itself dates back hundreds of years; our distant forefathers, noticing that the whitened area within the normally black pupil resembled the white, foam-flecked spray of a waterfall, described the opaque lens as a "cataract"; and the old word continues in our use.

The picturesqueness and exactness of description unique to the

Bible are well exemplified in its descriptions of eye afflictions. For instance, the passage, Genesis xvii. 1: "When Isaac had become old and his eyes so dim that he could not see," strongly indicates that Isaac had a maturing senile cataract. In fact, cataract was common enough to bring into practice an operative technique aimed at its cure: The Code of Hammurabi of about 2000 B.C. fixed a penalty for operating unsuccessfully upon a blind eye. From the earliest time of man until today, cataracts have been the most frequent cause of blindness in old age.

While there are, of course, no statistics that have come down to us of the incidence of cataract in Isaac's time, it is probable that it was as great as it is today. There are 1,000 applications for blind relief in this state and, according to a recent survey, about 2,000 blind in the total population of 1,600,000. Among the 1,000 from whom applications for blind relief have been received, 320 were diagnosed as having "cataract." It is fair to assume that the same proportion would hold true of the other 1,000 from whom applications have not been received, so that there would be a total of about 640 who have cataract. This latter figure would be the basis for the statement that contemporary statistics of the blind in the State of Washington show the incidence of mature cataracts causing blindness to be .04 per cent of all the population. Cataract is the cause of one-third of the cases of blindness occurring in persons over 60 years of age in Washington, and compilations from other states or districts will reveal similar figures.

Cataracts and blindness, however, should not be too closely linked together, in spite of their apparent hand-in-hand association, and even though cataracts are the major individual cause of blindness. Among cataracts themselves various forms must be distinguished. These call for variations in treatment and suggest varied observations upon the possible future course of the different kinds of lens changes.

Normal Lens Anatomy

The eye is a small, round ball about the size of a large marble. The circular transparent area of the front part of the eye is the cornea. A short distance behind the cornea is the iris, of brown or blue color, with a normally black center, the pupil. Directly be-

hind, and virtually touching the iris, is the lens. As more or less light comes within the eye, the iris changes size so that a small or large pupil results, the pupil size being dependent upon the amount of light outside the eye. The normal lens also changes in shape but not in size. As the eye focus changes from a near point to a point farther away, the lens becomes thicker from front to back. This automatic focusing arrangement is seldom noticed because it is done effortlessly.

Definition of Cataracts

Normally, light goes directly through the cornea and lens just as it goes through two pieces of clear windowpane. However, when the inside windowpane is similar to frosted glass, a condition exists comparable to the condition in the eye when a cataract is present. Frosted glass breaks up light in a manner virtually the same as a mature, ripe cataract. Light can still pass through the frosted glass or cataract, but reading through either is impossible. One important diagnostic feature remains: that of perceiving in which direction a light appears. Upon that essential fact depends the decision of whether an eye may be helped by certain measures.

Although a cataract lens may prevent good vision, the inside portion of the eye, the retina, is not damaged because of the unused lens. Light projection, therefore, is not changed and removal of the lens should give a satisfactory result. But if the retina has been damaged because of disease, removal of the lens will avail nothing.

The life of the lens of a human eye does not follow the usual line of development which characterizes other parts of the human organism. The eye is fully developed at parturition, and may be said to begin its development into old age almost at the birth of the child. In fact, sometimes a lens initiates such a rapid change that it prevents vision in a child who is but a few years old. This condition is termed a congenital type of cataract, a name not strictly true but very suggestive.

Every eye lens has a nucleus, or vital center, and it is this nucleus that begins to age at birth, or even before. This physiologic change is the only structural alteration to be considered at present. It takes place spontaneously, without any initiating injury, pro-

gresses slowly, and is a normal accompaniment of increasing age. The eyes of middle-aged persons and of every elderly person undergo this normal, non-pathological change which is compensated for by the use of glasses. It is a type of change but little different from those which do seriously interfere with vision and which cause total, or almost total, loss of sight.

Changes in the lens of an eye occur without pain and come about so gradually that the alteration in vision may be easily unnoticed until fairly well advanced. The lens changes may even be so slow that never within the lifetime will any treatment be required beyond the more or less frequent changing of glasses. On the other hand, the rate of progression, especially in persons over fifty, may be fairly rapid, reaching its culmination as a cataract within a year or two. Normally, from five to ten years are required before complete "maturity" of a cataract is reached. Definite knowledge as to why cataracts form in one person's eyes and not in another's has not yet been determined, although certain diseases—notably diabetes—cause a disturbed nutrition within the entire body and promote the formation of cataracts within a few months.

Inasmuch as cataracts that occur only in the older ages are being considered in this article, we have but two main types of cataract to describe: those having a hard center, a nuclear sclerosis; and those with a hard periphery, a cortical type. The hard center is the culmination of a process that ends in a loss of water and albumins that are soluble in water. The entire lens first slightly increases in size because of a change in the amount of water which it contains. When more water is included within the confines of the lens covers, and the lens swells, the opacity becomes increased. After the opacity has extended throughout the lens, the original lens volume is resumed by a slight loss of water. During the swelling period improved vision is sometimes noticed, at times the improvement being so great that glasses may not be needed. As the lens returns to its original size, vision is usually reduced to a marked degree.

Those cataracts due to a hardened periphery, cortical cataracts, result from changes in the layers of the lens outside the center of the nucleus. Opacities similar in appearance to the spokes of a wheel or large irregular shapes or wedges may form. Water is

absorbed by the lens and increased volume or size results. Opacification of the entire lens usually follows, with the natural resultant poor vision.

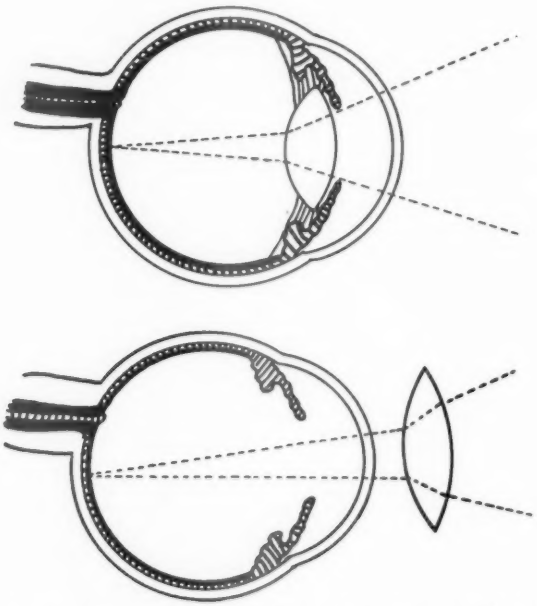
Methods of Treatment

While certain drugs have been found to cause cataracts, none has been discovered which will prevent or always retard their progression. Many drugs as well as many drug combinations have been tried. Numerous other wishful methods of treatment have been devised, such as massage, heat, and light; but no such treatment has yet been found that secures a predictable cure in even half of the cases tried. Not infrequently the originator of a new treatment has results that are not obtainable by another eye physician. Furthermore, progress of a cataract is so slow, and often inconsistent, that, with or without treatment, it may seem to be improving.

Virtually all eyes that have become blind by cataract alone can be helped. Many of these eyes may gain normal vision and most, if not all, may gain a very usable vision by the removal of the opaque, clouded lens. The method of removal has been so greatly improved that it results satisfactorily in nearly every case; even statistics of as late as thirty years ago cannot show results that compare with those of today.

Various means for the removal of the lens are known. Until recently, in modern medical practice, lenses were depressed away from the pupil into the rear part of the eye. At the time of Hammurabi it is not improbable that an actual cut was made into the eyeball for the removal of the lens. An exact description of the method prevalent at that time is not available but apparently the lens was removed in one of the methods used today. The method apparently was forgotten, because during a span covering hundreds of years only ineffectual procedures were used. About a hundred years ago, the modern method for removal of a cataract lens was initiated. At the present time the lens is completely removed from the eye. Sometimes the outer of the two covers, or capsules, of the lens is not removed, this being known as the extracapsular method. Sometimes the lens and both capsules are removed at one time, the latter then known as the intracapsular method.

The extracapsular procedure has been practised for many years, and is applicable in every case of senile cataract. The intracapsular method for removing a lens is a newer development and, in those cases in which it can be used, has several advantages over the extracapsular type. In addition, the great improvements of local anesthesia within the past few years have markedly altered the methods and immensely improved the results.



Upper diagram indicates the path of light passing through the normal lens inside the eye; the lower diagram indicates the path of light passing through the lens outside the eye from which a cataractous lens has been removed. Note that the retina receives rays in much the same manner as in the eye in which the natural lens is present.

After the cataract lens is removed, the eye cannot see well unless a spectacle lens is used to replace some of the power that was formerly supplied by its own lens. A glass lens is now placed outside the eye and worn just as an ordinary pair of glasses. If a favorable result has been obtained, one pair of glasses is used for distant and a different pair for near vision, or a bifocal lens may

be used, just as in ordinary life. No longer is the eye handicapped by the frosted cataract lens, but instead light comes into the eye through this artificial lens exactly as it would pass through a normal eye lens. It is still necessary to wear one pair of glasses for near vision and one pair for distant vision, for the power of accommodation depends only on the ability of the lens to change shape, adjusting itself for different focus, either near or far. The entire procedure may be stated simply as the removal of a useless cataract lens and the substitution of a clear, usable glass lens that is worn as easily as any other pair of glasses.

Results

The prevention of blindness by the removal of the lens is truly remarkable—almost miraculous. Results of even fifty to sixty years ago are incomparable. More than 95 per cent of all eyes operated on for a cataract have very usable vision, while the majority have almost as good vision as was present before the cataract began to develop. Each eye presents an individual problem, not only in the method of operating, but also in the results to be expected. Accurate statistics have been gathered in the State of Washington of blind people on relief. Of the total, approximately a third owe their blindness to cataracts. Of this group, only certain cataracts are amenable to treatment, but of that selected group who were treated almost 90 per cent have had such good vision that they are no longer eligible for blind assistance. Equally good results are obtained in private practice, in all parts of the country. No matter how telling the statistics of improved vision—they cannot describe the drama of restored sight. Words are inadequate to express the elation of a blind person who can again use his eyes; who is freed from dependence upon others; and who has been given back the beauties of a world of color and form and motion.

When Shadows Fall

E. K. Smith

A MOVING account of the emotions and experiences of a cataract victim before and after a successful operation

IT JUST could not happen to me; no one in my family had ever been bothered with eye trouble; and, in fact, glasses as an aid to vision were something for late middle age, and then only to avoid the annoying necessity of holding the book at arm's length. Indeed, if their arms could have been stretched a little more, I doubt if my folks would have bothered with glasses. No one of my own or the prior generation had ever been in a hospital, save as a visitor, and medical help was had only in extreme cases. So I consoled myself with the idea that my failing vision was due to overuse of the eyes, and, accordingly, eased off in my reading and writing.

Still my eyes were not right, did not seem to be able to continue at a task for any period of time, and, worse still, even ordinary vision was handicapped. I tried a stronger bulb for the light fixture in my room; I cut down on my work under artificial light; but the trouble would not remedy itself. Bits of information from various books I had read came back to me, and conversations half remembered were now recalled—about hemorrhages, kidney trouble, and other ailments; but the idea of some progressive eye disease never occurred to me.

The worries of professional life, my heavy business engagements, and the financial worries of the depression, then in its full tide, did nothing to help the nervously exhausted state in which I found myself. My own doctor had died a short time before and I had not engaged any one in his place to whom I could turn as freely as to him, who had been a boyhood friend. I knew now that I would have to stop business temporarily, if not permanently, and this

added to my troubles. The office must be taken care of; my employees who had been with me for years must be looked after; my investments must be guarded; and cash must be amply provided for medical and hospital attention.

I stumbled through all this, dreading the subways and the dark streets as winter drew on, for darkness seemed to increase my difficulties. I came home while it was still light, which curtailed my working hours. I gradually gave up going out at night, and, when travelling about the city, used taxis, which painfully increased expenses. It is disheartening to watch the meter in a cab, but to see it go around and around, not even stopping at the traffic lights, all the way down to the Wall Street district, was enough to discourage an optimist. I shifted as much of my work as possible to other shoulders, but there was an obligatory minimum that could not be shirked. Stairways became a nightmare; the edge of one step, if of the same color, blurred into the next.

One night, on leaving the subway to walk a half dozen blocks home in the bracing air of a November dusk, a fear came on me as I realized that I could not tell by the lights whether a vehicle was moving or still until it was almost on me. On this walk, which naturally was slow, I turned down a side street that had ordinary illumination, but not the brilliance of the avenue, and in the middle of the block I ran against a man coming toward me because I could not see him despite a bright light on the corner.

Another time I was riding home on the subway—on a local, of course—peering painfully through the windows as the stations passed, trying to distinguish either the characteristic symbols or the numerals of the street or avenue. I stumbled out blocks beyond my destination and crossed over and took a downtown train, but stood by the door of the car platform until the familiar appearance of my usual stop warned me to get out. The flashing lights and the warning horns of the automobiles at a crossing confused me, and I realized that life in general was geared to the normal and those without normal vision were handicapped even in their most ordinary pursuits.

Finally matters worked themselves out; my employees were gradually located in other offices; my business was taken care of, my bank account strengthened to reasonable proportions, at least

enough to take care of things for the present; and then I went home and rested and slept for a week. Why I did not immediately go to the specialist recommended I do not know; perhaps it was a fear of what his verdict would be. I was getting a taste of shut-in life, as I could not read, and went out for a walk only when someone accompanied me.

At last, finding no further reasonable excuse to detain me, I went to the office of a well-known eye doctor, located in a medical building in the midtown section. The directory in the entrance hall contained a regular "who's who" in the medical and surgical life of the city. My engagement was for 10:30 A.M.; at 10:45 I entered, stumblingly, into the private room for an examination. Behind a flat-top desk sat a small, gray-haired man with a small gray mustache, busily writing. After greeting me and requesting me to be seated, he continued writing in silence for a minute or so, although it seemed much longer. Then a series of questions: how long the trouble had lasted; when it was first noticed; what illnesses I had had; when the acute symptoms first appeared; my age and occupation; use of glasses; and other queries I have since forgotten. The examination next took place, most of which in the excitement made no particular impression on me, although I have a recollection of trying to read rows of letters, which diminished in size with each new line. Then I rested my head in a frame with my chin on a bar, while a large circular instrument with fan-like radiations from the center and a lighted bulb in the center, revolved, with the operator seated behind and looking through, moving the disk back and forth on its axis. Then some drops were slowly placed in my eyes and the doctor made a further test in a dark room. First he raised a candle above and carried it below and to either side of my eyes, and then he pointed a small electric flashlight from one side to the other, so that its rays struck my eye. He questioned me about my reactions. Both the candlelight and the flashlight were distinctly seen. Next, while still in the dark room, the doctor asked me to guess the number of fingers on his hand, which he opened and closed so as to form different number combinations. I did not have much success as things were pretty dim and about all I saw was the general outline of the hand. It was impossible to call the number of fingers held open at any time. Again we went

back to the circular, fan-like instrument for further examination. Finally the doctor examined my eyes with a powerful magnifying glass which was lowered until it touched my eye. This concluded the examination, which seemed rather an ordeal to me, and I sat there while the doctor sat behind his desk writing quietly, and finally, placing the pen in its holder on the stand, he asked me, "You know what it is, probably?" And he confirmed my suspicion that I had a cataract.

I thanked him and put off the question of an operation for a week, at least, until I had straightened out certain matters. As I went home in a cab, I thought over the situation. I knew nothing of cataracts, except that they could be relieved by an operation, but what this operation meant, to what extent it would restore my sight, or whether the cure was certain, were beyond my knowledge. At the examination the elderly physician spoke most encouragingly of the success of most cataract operations, and urged that no delay take place, as I was almost helpless in getting about. These kindly observations did not register very well, as I wanted to get away and think matters over, but I made an appointment to call upon him the next week and arrange for hospitalization. Then I started buying the necessary equipment for a stay at a hospital of a week or ten days.

The hospital was a large gray building, with an immense free clinic devoted to the special treatment of eye, ear, and throat ailments. The private pavilion was located on the upper floors, and consisted of a large number of rooms of various sizes, with and without baths, well furnished and delightfully free from the stereotyped hospital atmosphere. Indeed, during my entire visit at the institution, save in the operating room, I always felt as if I were in some hotel. True, the coming and going of doctors, the white uniforms of the nurses, and the occasional period of intense activity caused by an emergency case were reflected in the daily life, recalling one to the actualities of the case. But ordinarily the sound of children's voices, the deep tones of physicians greeting each other, an occasional burst of radio music from the open door of some convalescent, and the constant stream of visiting friends and relations, gave a vibrant touch to the place. The peculiarities of the ailments to be treated and the course of the treatment of these special ill-

nesses seemed not to require that complete silence and tip-toed quiet one associates with hospitals, or it may have been a conscious effort on the part of the authorities to get away from all suggestions of sanatorium life. I conversed with relatives, friends, physicians, surgeons, nurses, hall nurses, and dietitians, until my room became known facetiously as the "crossways" of the hospital. From the moment I awoke to the time I was tucked in at night, I had no lonely moments. Greetings were sent by patients in other rooms through the nurses, and offers of hospitality were frequent, if one were so inclined. Radios were installed in many rooms on my floor, and on a warm evening the voices of Amos and Andy could be heard floating down the hall. It was good fun, that and the nurses' gossip, telling of the daily life of the floor, how the stage star was taking her operation, or the elderly doctor, unused to medical treatment for himself, was proving a handful for the nurse. It kept one from that bane of all sick cases, self-pity, and, perhaps, dejection.

The morning I entered was warm for March, and the windows of the taxi were open, but, owing to the dark, cloudy day, and my eye trouble, I saw but little on my way down. After an interview with the clerk in charge, I followed the porter, who had my bag, to the elevator, and arrived at the room that was to be my home for a week or so.

My nurse met me, and in a few minutes, after I had put on my pajamas, I climbed into the immaculate high raised bed. The usual analysis was made, a sedative pill given, and shortly thereafter the anesthetic drops were spreading over the eyeball, producing a slightly dizzy feeling which soon wore off. Some further drops were given, and then, wrapped in a bathrobe, I was trundled out to the elevator and taken to the operating room. On the way down the corridor from my room a well-meant jest from another nurse to mine, about "taking your patient for a ride," did not set well on my nervous mind—the implications were too painful. I dropped the bathrobe and at the nurse's directions climbed up a small stepladder of about three treads to reach the operating table, where I lay full length under a very bright light, scarcely three feet above my head. The assisting surgeon skilfully washed my face and eyelids with a sponge and soap and then syringed it off with warm water. As soon as I could open my eyes after the

washing I saw the operating nurse, the orderly, and the assisting surgeon moving about quietly in white robes, head and chin cloths.

And now, after a warning that a "little inconvenience" would be felt, the eyelids, upper and lower, were punctured and some solution of cocaine was used quite extensively, so that the power to open or shut the eye was temporarily lost. This having been tested to the satisfaction of the operating surgeon, a ring or band, called, I believe, a retractor, was inserted over the eyelid and on the eyeball to hold the lid back, all without pain of any kind, or indeed any definite sensation. "No matter what you feel, don't wink or squeeze your eye," said the surgeon. "If you want to hold on to anything, grab the sides of the operating table." And then I encountered the most peculiar sensation I have ever experienced. I knew and, indeed, felt the knives and needles cutting and entering the eyeball; I could feel the sharp edges or points, and yet there was no actual pain. It was as if it were all being done on someone else and I were looking on. The feel of the edges or points was just that sympathetic, imaginary sensation one has when viewing some such scene. It might just as well have been a schoolboy initiation, where long icicles are drawn across the skin and the unlucky blindfolded one is told that "cold steel" is being applied. Not many strokes were made in the whole operation, and only the last four really hurt—they were deep and swift and sure. One down, one across, again down and again across in the same place as the first cross-cut, and then I was told to relax, as it was over.

The eye was now washed, cleaned, and cleared, and soon a pad was applied to each eye. I could feel the cotton on the edges and the vaseline as the pads were strapped on with adhesive plaster. To keep out all light, a half mask was tied around the upper part of the face, a mask of black material with closed protuberances where the eyes are, shaped to fit the nose, an eyeless mask that must have looked a little weird. After being wrapped in a blanket I was carried on a stretcher down to the elevator and then to my room. I was put down on my bed, and without my moving, the stretcher, through a system of connecting straps, was disconnected, and slipped from under me without the slightest trouble; the wooden bars forming the sides became unhitched, and the canvas straps

forming the supporting bands were slipped from their connections, all easily and without disturbance to me.

And now began that period of quiet necessary after any operation, and particularly an eye case. No movement of the head was allowed; it must rest directly on the back of the skull; the arms could be moved, the legs also; even the hips could be turned slightly to relieve the strain on the back, but generally the body or trunk was not to be turned. With the eyes covered and the light completely shut out, a rather strange, half-dizzy sensation came over me and an almost uncontrollable desire to roll the eyeballs. Soon I felt an itching in the eye, and of course this was where the mask prevented any damage to the eye from a rubbing finger. As soon as the hand was irresistibly raised toward the eye, it touched the mask and I realized that I was on forbidden ground; in addition the covering kept the hand off the eye. After the operation there came a sensation of burning, probably due to the cocaine or other anesthetic used to deaden the nerves, but this lasted only an hour or so, and save for the dressing, practically no pain was suffered. But the hours passed rather slowly at first, broken occasionally by a visit or a glass of milk or some broth or tea. Soon I fell into the routine of the place; there was no restriction on talk; and many long and pleasant conversations were had with the nurses, friends, and doctors. As the day wore on and night approached the reaction came, and I suddenly grew tired but not sleepy, and after a half hour of quiet the old restlessness came back. Soon my neck felt strained and the bed-head was raised or lowered to relieve the tension. The bed could be raised or lowered at the head or foot, or arranged in a number of ways to ease the body, even if I could not voluntarily move my trunk or head.

Still there was very little sleep the first night; in fact, I do not believe I slept an hour the night through. Every time I would move (of course I could not see) my night nurse would be at my bedside inquiring about my needs and, if necessary, supplying them. The night ended, however, and after an early morning nap I was greeted by my day nurse, who had come on duty a little before. It was curious what a desire I had to know the time and how frequently I inquired about the hour. It really did not matter as I could not make any practical use of the knowledge I got from

learning the time, and yet at the moment it seemed very important. Once or twice during the first night I had a feeling of nausea and I feared that retching might start a strain or a hemorrhage of the eye with very unfortunate results. But nothing happened and small glasses of carbonated water restored my stomach to quiet and relaxation. The skill, patience, and willingness of the nurses made convalescence as near a pleasure as such a condition could be. The clever shifting of the bed linen, the bathing and dressing in bed without disturbing my position or causing me any discomfort, were always marvels to me. The care for the room's temperature, ventilation, and light, the guarding of the patient from chill or danger from damp clothing or bedding was constantly in evidence. The sponge bath at night and the alcohol rub induced many a good night's sleep. Of course the diet increased materially as the time went on, and on the second day I could be moved, but not turn myself, on one side, that is, to the side opposite the eye operated on. Indeed, never during the whole time I remained in the hospital did I sleep on the side where the operation occurred.

After the second day the mask was taken off, the eye pads were removed, and the eye was examined under a strong light by the operating surgeon, and after he had bathed it with warm, sterilized boric acid solution the pads were replaced with new ones, the mask put on, and the quiet life resumed. Save that the nurse had to move me, there was little restriction on me except that I must refrain from tossing about. The easily adjusted bed made me comfortable; I could sit or lie down or change my position in a number of ways.

This went on for a week, and then one day the doctor, making his daily examination, took out of his pocket a magnifying glass and after I had correctly counted the fingers which he presented to me, he surprised me by showing me a watch crystal through the glass and letting me see the dial. I could not at first believe it, but there were the hands, there were the numerals, and there was the time as plain as I had ever seen it in my life. This was an old medical trick, of course, but it aided materially in restoring my confidence in the full restoration of my sight.

All the goings-on in the hospital were described to me: the little child in Room 10 was going home tomorrow; the young woman

across the hall was a much-publicized debutante; a certain well-known educator had a bad ear and was being treated in the end room. I was regaled with the names of the celebrities who had been in the hospital for treatment, who had suffered from my own trouble, and were now back in civic life, working as of old. All the old hospital jokes were told, and when the young house surgeon came to make his evening visit, it was usually to smoke a bit and tell stories. Of course I was examined as to my affairs, and I suppose my history or whatever I told was familiar to the other nurses as well. There was no harm in the small talk about me, and through it the patients got acquainted, in a fashion, so that greetings were sometimes sent to one another.

After a week I was allowed to sit up and wobble weakly to a chair, exhausted. A couple of hours tired me out completely, but the second time I stayed longer, and finally, with the nurse's help, I was walking around the corridor. The mask had been discarded, and first one pad went and then the other, and my sensitive eyes were protected from the light with dark glasses. The light hurt my eyes, which had been hidden from brightness by the pads and the mask; now I had to ease the glare with the colored glasses. Several days of wandering about the corridors of the hospital and a feeling of increased strength gave me an idea that I would soon go home.

On the tenth day of my hospital visit I started home. The ride was far different from the trip down to the institution, and I was in a rather joyful mood, realizing as I did that I should have sight and comparative normality in a short time. I still wore colored glasses, and while I could make out things fairly well, they lacked outline and definiteness, which only eyeglasses could supply.

Several trips to the doctor's office followed for the next few weeks, and finally, after a thorough testing with the eye charts, a prescription was given to me for reading and distance glasses. And here is where I met my real trouble. When I got the glasses, I was warned by the optician that I would have some difficulty in going about because of the powerful lenses, and I did have quite a time for about a week or ten days. As soon as I shifted my gaze from one given plane to another a feeling of dizziness came over me, so that I thought I was falling and sought some support. I felt very

insecure and was afraid to cross a street for fear I should suddenly have this dizzy sensation. This caused me to keep my head in a stiff, angular position, to avoid changing the plane of my vision. The sidewalks and the curbs were difficult to navigate and the stairs, especially the stone ones outside buildings, presented the most difficulty.

But gradually and automatically I began to judge distances and heights and measurements and to adjust myself to the new conditions. I made many ludicrous mistakes, knocking over cups of coffee, and missing the butter dish by at least six inches. Even this ceased, and once again movies and theaters received my attention.

As yet night presented some hazards, at least in my imagination, for I felt I would have a little trouble in crossing a busy corner. Still after a try or two even this disappeared and I began attending functions after dark, few, at first, but then a number of others. Crowds, because of my withdrawal from active life, caused some embarrassment, but persistence overcame this as well. And when I attended a banquet, making use of several means of conveyance, I felt that I had traveled a long way on the road to normality.

The most enjoyable of all the benefits conferred on me by the operation was the ability to resume reading; for I had found reading my chief pleasure from early boyhood. And so, with vision again possible, I have made full use of all that I missed so much when my eyes failed me. I am happy that through the skill of a fine physician, who devoted himself to my case, I can again take part in the world's affairs.

Eye Health in Teacher Education*

ANALYSIS of the present situation, together with recommendations of the Advisory Committee on Teacher Education, for the National Society for the Prevention of Blindness

Chairman's Foreword

The Advisory Committee on Teacher Education was appointed by the Board of Directors of the National Society for the Prevention of Blindness in the autumn of 1936, for the purpose of assisting in a study of the problems of eye health in connection with the education of teachers.

The work of the Committee, in its meetings and correspondence, has dealt mainly with efforts to get a clear picture of the extent and nature of eye health content in the professional curricula of colleges and universities engaged in the preparation of teachers. Through visits to a limited number of institutions educating teachers, the Committee Secretary has assembled a fund of information related to the problems. This information has been supplemented through correspondence with a larger group of colleges and universities. In the light of these data, the consideration of which has been limited to the brief annual meetings of the Committee and to some efforts to secure group thinking through correspondence, the Advisory Committee offers the following statement for the consideration of those engaged in the preparation of teachers. It is hoped that its reading will arouse interest in this field of work and show the possibilities of making a significant start in this important field of service.

* This statement grew out of the deliberations of the Advisory Committee on Teacher Education for the National Society for the Prevention of Blindness and the investigations of Dr. Anette M. Phelan, Secretary of the Committee and Associate in Health Education. It was incorporated in a report by President G. A. Selke to the American Association of Teachers Colleges at its meeting in Atlantic City in February, 1938, and appears in the 17th Yearbook of that Association.

The Present Situation

For 70 years educators have been giving some consideration to the vision problems of school children. The attention seems not to have been continuous, nor to have made any lasting impression on the education of teachers. Contributions of pertinent information discovered in laboratories of medical research, physiological optics, or engineering have not found their way, to any extent, into curricula for teachers.

In the years following the World War attention to teacher education, so far as eye health goes, centered on the professional preparation of special teachers for sight-saving classes, organized for children with seriously defective vision. The emphasis was almost wholly on remedial measures for a relatively small group—1 in 500 of the school population. Out of those experiences, however, has come a widespread appreciation of the significance of classroom illumination to the child's visual efficiency, comfort, and eye health.

Recent inventions again have turned the attention of school people to the possible relationship between vision and learning. But the newly invented instruments for the study of vision cannot be used satisfactorily without a clear understanding of the fundamental problems of eye health. Most classroom teachers today lack the background of information essential to such an understanding.

Evidence of Need for Attention to Teacher Education*

A survey of teacher practices indicates that the average teacher does not recognize the obvious individual differences in children's vision; that he is unable to check his observations with a simple test; and that he is oblivious to the classroom adjustments necessary to safeguard the eye health and efficiency of children. Among conditions revealed in the survey and reflecting a lack of appreciation of important factors in eye efficiency and health the following are suggestive:

> Classroom window shades usually drawn to cover the top half of the window.
>
> The space near the window utilized for fern stands, tables

* The survey and inquiries yielding the data were made by Dr. Phelan.

and lockers, with children's desks arranged on the dark side of the room.

Desks arranged in hollow squares with some children working in their own shadows, others facing a sunny window.

Nearsighted children seated in the rear of the room.

Children showing effects of eyestrain seated in a poorly lighted part of the room.

Children rated on intelligence or achievement on the basis of paper and pencil tests taken in poorly lighted sections of the room, and without an investigation of the vision status.

Young children in the first grade subjected to drills on quick recognition of symbols and words on the printed page, or imbued with a sense of failure over the inability to meet artificial reading standards set for promotion to the second grade.

An objective test on the eye health of school children given to 1,200 senior students in 20 institutions preparing teachers reveals that less than half the students have the fundamental information on eye health needed by any teacher.

An inquiry regarding the curriculum offerings in eye health was sent to 62 universities. Forty-two responded. Of these, one-third reported no offerings; one-third offered one unit, and the remaining third offered two or more units in eye health. In the last group, only eight universities devoted more than two semester hours to the subject.

Committee Recommendations

Institutions engaged in the preparation of teachers should give serious consideration to the content on eye health in the professional curricula. The required units of all curricula for teachers should include provision for meeting at least the following three needs of classroom teachers for:

1. Fundamental facts on the eye health and efficiency of children; opportunities for learning to recognize obvious individual differences in children's vision; ability to check his observations with a simple test, and to make the schoolroom adjustments necessary to meet the needs revealed by observation or test.

2. An understanding of the significance of the biological facts related to visual acuity, eye co-ordination, and growth of the eye; and the elements, including the curriculum, which may influence visual efficiency or the normal processes of growth.

3. The basic facts on the hygiene of classroom lighting, including the factors influencing adequacy of illumination and glare; and experience in determining classroom adjustments needed for eye hygiene.

Providing satisfactorily for the education of teachers in eye health presents some complicated problems. The range of fundamental information involves many fields, such as, ophthalmology, physiological optics, growth and development, physics, general science, school organization, and psychology. For this reason the student needs cannot be met adequately in one college department.

The needs for faculty education are imperative if the information gained in any department is to have a chance to function in the daily life of the student. There are common needs for adequacy of light and for protection from glare. Reliable research laboratories have furnished basic pertinent facts. These facts are needed alike by faculty members and students.

The need for functional information has not been met adequately by the lecture method, but seems to call for practical first-hand experience in actual school situations. For example: prospective teachers need to master the simple skills necessary to discover eye health problems in the classrooms. These skills call for an opportunity for actual practice with children not always available in connection with the professional curricula of institutions educating teachers.

Reports of educational investigations on the influence of vision upon the child's development, achievement, or school progress have been voluminous. The evidence offered is not always convincing, but points to a need for a critical summary and evaluation of data. Such an evaluation should reveal specific questions to be answered by further research.

A careful scrutiny, comprehensive in scope, of current practice could be expected to disclose approaches, content and organization of permanent value. University and college courses on eye health

of school children and eye health in teacher education might be evaluated on the basis of the functional information and profitable experiences included. Not only might the evaluation of such efforts serve the institutions where the offering is made, but the results might well be shared with universities and colleges having in mind the introduction of units of work on eye health in the professional curricula.

Commercial enterprises will likely continue their contributions in equipment. To be of greatest value these contributions should be accepted tentatively for experimental use and evaluation, and recommendations for their widespread use should follow rather than precede a reliable evaluation.

Research and medical organizations and educational agencies have obligations to discover or disseminate authentic information related to eye health, and to review basic facts periodically in order that institutions may have readily available the best recent information bearing on the problem. However, the responsibility for initiating any enrichment of curricula with regard to their treatment of eye health lies with the institutions themselves.

The decision by an institution to offer a program of instruction in eye health is one thing. It is quite another to secure the placement of the essential units on eye health in the various departments able and ready to accept responsibility for them, and to secure the assignment of the units to instructors qualified to present them to prospective teachers. Such a co-ordinating function within the institution is fundamental to a sound progressive program of instruction which will avoid the gaps and duplications characterizing the present situation.

It seems logical to suggest that, in each institution preparing teachers, some one person with an intelligent and sympathetic understanding of eye health problems of school children should be assigned the responsibility of securing a well-rounded program of eye health, including an intelligently selected eye health content, and providing for a co-ordinated program of instruction through co-operation of all the departments and instructors concerned.

Vocational Guidance for Sight-Saving Classes

Marie C. Kniewel

ALTHOUGH due emphasis must be placed on individual handicaps or capacities, the sight-saving class pupil should be given as wide a vocational choice as possible

THE problem of vocational guidance for sight-saving class children must be discussed from at least four viewpoints: first, with regard to the aims of the special education which these particular children are receiving; second, from the viewpoint of the individual responsible for this guidance—the sight-saving class teacher, and her preparation for such work; third, from the viewpoint of the individual child—his characteristics, his abilities and disabilities, his likes and dislikes, his educational possibilities, his home environment, etc.; and, last, from the standpoint of the vocations which are actually available to persons with less than normal vision.

Vocational Limitations of the Visually Handicapped

When we keep in mind the specific aims of the education of the low-vision child, we see that the problem of vocational guidance is not at all simple. When we consider that we must make these children capable of conserving their vision, we find that the choice of vocations for them becomes more or less limited, depending, of course, upon the individual eye difficulty, and upon the ingenuity of the teacher who is handling the problem. If she is over-emphatic in her consideration of this aim, she may unnecessarily limit the field of vocational suggestion in guiding her pupils. Again, if she is not sufficiently informed concerning a great number of possible vocations and their relation to persons with low vision, or rather

their possibility of pursuit by such persons, she will be too limiting in her guidance, and her program will be one of too many don'ts, unnecessary don'ts, harmful to the welfare of the child. On the other hand, if she sways to the other extreme, not giving enough care to the problem of conservation of vision, her vocational suggestions will be of no value to her students, and will defeat one of the essential purposes of the sight-saving class.

Class Discussions of Suitable Vocations

What, then, can she do? She can make the problem of conservation of vision an integral part of the problem of vocational guidance. She can say: "Let us discuss various vocations, careers, in which the pupils are interested; but let us, in each case, determine whether or not this specific vocation is one in which the individual might earn a living, *without impairment of his eyesight.* We must consider not only eyesight, but other necessary physical qualities, mental qualities, interests, etc." Of course, the teacher herself must have a wide range of information concerning such vocations. Therefore, she should avail herself of the vast bibliographies prepared by such agencies as the National Occupational Conference, the *Vocational Guidance Magazine,* and others. Then, too, the teacher must make available to her students information concerning certain vocations, in order that they may be enabled to discern their own fitness for various careers and also that they may ascertain which vocations are best suited to their individual needs.

Positive Vocational Advice

In a consideration of the next of the major aims of sight-saving education, namely, to provide pupils with the opportunity of making normal school progress, we are more concerned with the teacher's methods and means of directing and suggesting vocations for her pupils. Thus, since she has before her the immediate aim of keeping persons with low vision as nearly normal as is possible, she must ever be wary of giving negative vocational guidance—she must watch out for her possible don'ts and substitute positive suggestion in place of these harmful don'ts. She must minimize rather than emphasize the children's eye defects, without, however, forgetting the actual existence of such defects. She must, in short, be

a good psychologist: she must know her pupils thoroughly and then give guidance in the light of this knowledge, with as much tact and skill as she can bring to the task. So far as possible, she should see that these children are given such vocational guidance as is available to children in the regular classes; that they enter the discussions of the normally seeing children on this vital question; and with her guidance, particularize these discussions only from the standpoint of eye hygiene—which should come as a normal contribution on their part.

The next aim of the sight-saving class is definitely one of positive vocational guidance—such that it will enable the individual to choose a life work, if possible; such that he, consequently, will be enabled to occupy a useful place in the community. Formerly it was thought that the visually handicapped person could not lead a normal life, but now we have accepted the idea of fitting him into a normal place in the community—making him a worthy citizen, a capable citizen, independent, free, despite his low vision. Hence the actual guidance which he receives must be quite accurate, if it is to help him fit himself for this position. It must, without placing too much emphasis upon his handicap, take it into consideration, and at the same time make him feel that, as an individual, he can derive real joy and satisfaction from his chosen vocation. It must, in short, offer him the prospect of a normal chance for success and independence, equal to that of his more fortunate neighbors.

It is but reasonable to assume that the teacher, since she is to be a principal factor in the vocational guidance of these particular students, should have some equipment with which to work. That is to say, she must be acquainted with the problems of vocational guidance in general, and must also be able to apply these to the special problem of educating the visually handicapped. It is, perhaps, rather fortunate that not much has been published on vocational guidance specifically designed for persons with defective vision, for if our aim is to give these persons as normal a development and education as is possible, it seems the best way to do so is to use as our source of information and aid, the literature published for the guidance of normally seeing persons—always, however, remembering that some allowance must be made for the particular defect in each child.

Sources of Vocational Information

Perhaps the best timely source of information is the well-known magazine, *Occupations* (formerly called *The Vocational Guidance Magazine*). This publication, in addition to publishing articles on all phases of vocational guidance, reviews new books on vocations, vocational guidance and vocational research, and often lists valuable bibliographies on specific vocations, as well as general bibliographies. One of the most interesting of all these is the one called *Books About Jobs, A Bibliography of Occupational Literature*, by Willard E. Parker. This is the most complete work of its kind ever assembled; it contains a list of over 8,500 titles selected from the publications of the 15 years preceding 1935. The books are classified by occupations, and very carefully annotated. Surely such a work would prove valuable to any guidance director, and especially to the sight-saving class teacher, who might not know just where to find certain information about a particular vocation.

Of course, it is not to be assumed that the sight-saving class teacher should merely direct the student to such a bibliography, nor even to the books themselves, but rather that she herself should use such a bibliography intelligently, and make the desired information available to the students in the best sight-saving manner. Again, it must always be remembered that, because of the nature of the sight-saving class itself, a program of vocational guidance must not entail a great deal of outside reading. These books are to be used merely for information, if possible directly by the teacher, who relays the information to the pupils. When the teacher herself is equipped with information concerning a specific vocation, she can help her pupils to help themselves by initiating oral discussion about the vocations with which they are particularly concerned.

Sight-Saving Class Pupils as Individuals

If the sight-saving class teacher is to be as well prepared to give vocational guidance as she is to do her regular teaching, she must be capable of keeping constantly in mind the individual differences of her students. This emphasis on the individual must always be present in any form of guidance, and particularly in the guidance of the partially sighted. The first duty, then, of the sight-saving

class teacher is to know each of her pupils thoroughly. This knowledge must include an accurate knowledge of his eye defect, his physical condition in general, the possibilities of improvement or progressiveness in any physical disorder, his mental capacity, his emotional and personal limitations, his ambitions, his likes and dislikes, and his home conditions. Then, any guidance which she gives must be individual and, of course, objective. Whenever she discusses a certain vocation with her pupils she should be primarily concerned with the potentialities of the individuals she has in her class. She should not think "What are the vocations for sight conservation pupils?" but, rather, "How can sight conservation pupils adjust themselves to the vocations in which they are interested?"

Cultivating Wholesome Attitude toward Various Occupations

Keeping in mind the fact that she has to deal with children whose abilities, difficulties, habits, achievements, etc., vary greatly, the sight-saving class teacher would do well to teach her students very early in their school life a wholesome respect for all types of work. She should never, for example, show preference for the professions. Her own attitude toward occupations may easily be copied by the children, and for this reason she must be careful in appraising certain vocations. She will do well to discover early the child's potentialities, and if she finds that he is more likely to succeed in working with his hands rather than with his mind, she will guide him very early into such work. Above all, she should strive to develop in each child the correct attitude toward various vocations. This attitude is most important later, in the actual selection and placement in an occupation. Even if a child is mentally slow, there is always some vocation in which he can be successful. He should not be made to think that he is a failure simply because he cannot enter a profession. All work is honorable, provided it is honest endeavor to earn a livelihood. Furthermore, all kinds of work are necessary in our complex life. And no vocation should be frowned on, so long as it contributes in some way or another to the welfare of the community. Children with low vision and slow mentality should be taught to regard vocations rather from the viewpoint of giving service to humanity than from the viewpoint of the dignity

or lack of dignity of these vocations. They should acquire the attitude that doing any task well, even though it may not require mental gymnastics, *is* being successful.

Analyzing Personal Qualifications of Pupils

While the setting up of good attitudes toward vocations is a large part of the task of vocational guidance, some more or less formal study of vocations should be given to sight-saving class children, either in the intermediate grades or in high school. One of the best methods presented for some such program, which may be readily adapted to the sight-saving class, is the method outlined in "A Mirror for Students," an article by J. Harold Brennan in volume 13 of *Occupations*. Mr. Brennan would have the student rate himself on certain specified abilities as low, medium or high. Then the student may make three other such charts, rating himself on qualities of character, physical qualities, and, finally, qualifications of training which he already has or hopes to acquire. Next the particular occupation is studied with regard to these various abilities, character qualities, physical qualities, and training qualifications, the aim being to discover which of these particular abilities are necessary, which are desirable for the pursuance of the particular vocation. As each vocation is studied and the desirable and necessary abilities and qualities decided upon, it can be added to the chart and the recordings made for the benefit of the entire class. Finally, at the bottom of the chart some indication can be made of the comparative number of workers engaged in each of these occupations in the local community, and thus some possibility of placement can be made available to these future job-seekers.

Perhaps this formal study seems too involved for a sight-saving class program. Yet, when it is remembered that we are trying to make the education of these people quite normal and trying to tie it up with sight conservation, this method seems very usable, particularly because it makes the individual gauge himself with regard to his vocational possibilities. Finally, it does take care of the visual requirements without making them an abnormal issue—inasmuch as they are taken into consideration along with other physical requirements.

Editorials

Ellice M. Alger*

WE ARE come here this day to honor, by the presentation of a medal, the man Ellice Alger.

In our weakness of expression we offer this token of honor to one whose own works have builded a better monument and a more enduring emblem by the deeds of his own hand, by the products of his own mind, and by the charity of his own heart.

The ophthalmic scalpel and the healing collyria are but the symbols of his efforts. His good deeds perpetuate themselves through printed vellum and are propagated forever in the trained minds of two generations of ophthalmologists whose professional infancy he has nurtured to a sturdy manhood.

Professor Alger has taught me the best of ophthalmology, though I have never been under his direct instruction; and this is no paradox to those of us who have known him. I do not mean that his teachings have reached me through his writings alone, nor do I mean through his spoken word, to which I have often listened in the formal gatherings of medical men. I mean he has taught me as he has taught others by the human friendliness of his ophthalmic interest, and by an example which is one of service, far set apart from those sordid meannesses of a fast-moving commercial age.

One of my early professional pleasures was the reading of Dr. Alger's papers, and they made me want to know him. I think such an urge—"to know him"—is the one worthwhile impression I should like to leave in the hearts of the young men over whom I preside. I felt it a particular compliment the other day when one of the younger men of ophthalmology came to me with Dr. Alger's book in his hand. He wanted to know if we could not adopt it as our standard for study. He had stepped along with me to become a perpetuator—a gene—of Dr. Alger's labors. He, too, wanted to meet Dr. Alger. I can see as time goes on a never-ending stream of

* Speech delivered by the author in presenting the Leslie Dana Gold Medal to Dr. Alger during the 1938 meeting of the National Society for the Prevention of Blindness.

Dr. Ellice M. Alger receiving the Leslie Dana Gold Medal for "long meritorious service for the conservation of vision in the prevention and cure of diseases dangerous to eyesight, and for research and instruction in ophthalmology and allied subjects," from Dr. John N. Evans, member of the board of trustees of the Association for Research in Ophthalmology, who made the presentation address, appearing herewith.

disciples following the pen and word of Ellice Alger; propagating forever his teachings for the prevention of blindness and the good vision of mankind.

Dr. Alger—in the name of the Association for Research in Ophthalmology and the St. Louis Society for the Blind, I present you with the Leslie Dana Gold Medal for your "long meritorious service for the conservation of vision in the prevention and cure of diseases dangerous to eyesight, and for research and instruction in ophthalmology and allied subjects."

—JOHN N. EVANS, M.D.

New Section for the Review

TO AFFORD a closer working relationship with local and state groups throughout the country, directly or indirectly engaged in activities for the conservation of vision, we are planning a new department in THE SIGHT-SAVING REVIEW which we hope to introduce in the March, 1939, issue. This section will contain news of program developments of various organizations. In order that the material may be useful to all engaged in this field, medical societies, local prevention of blindness agencies, educational groups, Lions Clubs, Parent-Teacher Associations, and individuals engaged in prevention of blindness activities, are asked periodically to furnish the Society with comments on their sight conservation activities.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request

A Word to the Wise—About Eyes*

We older people who lived the greater part of our lives in horse-and-buggy days can't advise a modern boy how to ride a bicycle among speeding motor cars—we'd only beg him not to—and we can't tell him how to save his life from all the other deadly contrivances that we ourselves invented for his betterment. But there are some old perpetual perils upon which we are competent to speak. We are competent because—though we once said, as the boy says now, "That won't happen to ME!"—we've had time to discover what we did to ourselves.

In a scuffle the other day my great-nephew, George, got a black eye and told me it amounted to nothing; he'd had another just before this one. As he spoke, he was gouging at his other eye, corkscrewing his knuckles into it as if to excavate it. "Eyelid itches," he explained.

I recommended a different remedy and added: "If I were you, I'd avoid being hit in the eye by either a ball or somebody's fist, George. Did you ever hear of a detached retina?"

"No, sir. You don't want me to be a sis, do you?"

"Sometimes it's useful," I told him, and, as he still gouged at his eye, I suggested an object lesson. "Get a toughish young green plum, George. Do to it what you're doing to your eye; then open the plum and see what you've done to its inside."

He laughed. "Oh, you can't hurt my eyes!"

"No? They're indestructible—like mine?"

"Well—you know you're kind of

* Reprinted, with permission, from the October 1938 issue of *Good Housekeeping*. Original title: "To Whom it May Concern."

old, sir. I don't care what happens to me at your age."

"It's too bad," I said, "but you will, George. You haven't tried it; but I have, so I know. About your eyes, now, for instance, let's try something. Try being blind, George."

"All right." He shut his eyes, groped with his hands, took two steps, and touched a chair. "Oh, I guess I could get around!"

"Yes, George; and you might be lucky enough to get a Seeing Eye dog, and he'd keep you from bumping into things; and you could learn to read Braille and how to eat—"

"Eat?" he cried. "Trust me! Blind or not, I could always eat!"

"Could you?" I asked. "I'll give you that fishing rod you yearn for if you'll eat your dinner blindfolded so that you can't see at all."

George was delighted, and, at the dinner table he at first thought the experiment great fun; then he didn't. "Ow!" he said later. "That's the only bite I've got all the way to my face, and I loathe eggplant! I thought it was asparagus."

Afterward I heard him raking the refrigerator for cold food.

"Murder!" he said, when I joined him. "I'd hate to be blind. How long does it take 'em to learn to eat?"

"I don't know, George. You see, I was totally blind only a few months."

"Listen! What was all that about me not getting hit in the eye or gouging or—"

"Or reading in a bad light and some other things?" I added. "The eye is a delicate object, George," I said—a sententious old truth; but I'd had the misfortune to discover its meaning for myself.

BOOTH TARKINGTON
Indianapolis, Ind.

The Leper Colony on Molokai*

Up very early this morning. I am taking a six o'clock plane for the settlement of Kalaupapa, the leper colony on the island of Molokai. So many of the lepers are blind, so many have eye difficulties, that I have been invited to go to the colony to get some idea of conditions there. Last night I begged a thermos bottle of coffee and drink this as I dress; I must leave at 5:30, since the airport is a distance away. The sun has not yet climbed the mountains when we leave. We pass the fishing docks, where the sampans, painted blue for the protection of the Virgin, are returning from their night expeditions and drawing near with their catch of fish. Armed with credentials, we board the plane, for it seems much harder to get into Kalaupapa than to get out. The small special plane carrying six passengers is full and the pilot is already calling for "contact." The wings spread out over the sleeping city as

*Excerpt of a letter from Hawaii.

we rise high in the air. Everything below looks so tiny, like a child's toy city.

Soon we leave the headlands of Oahu behind and head toward Molokai. In 45 minutes we land on a peninsula jutting out into the water against a background of jagged cliffs that divide the settlement from the rest of the island of Molokai, which is given over chiefly to the raising of pineapples. The only connection is a perilous trail leading down the precipitous side of the cliff. There is a gate at the top, over which a watchman always keeps guard, for lepers may not mix with the general population.

I am not at all clear as to what I expect to find, possibly something horribly abnormal and morbid. I recall the story of Naaman and the curse of leprosy which made the victim "white as snow." But, just as at any other airport, we are met with cars, the resident superintendent is there to welcome us, and we are immediately taken to staff headquarters. The superintendent and many of the nurses live at headquarters within the special enclosure and here, also, the doctors have their own homes. The "sisters" have a home in one "unit" and the "brothers," in another.

We have breakfast at headquarters, bacon and eggs and toast and coffee, just as in any ordinary home, and then we visit the various "units." There are no children at Kalaupapa; those with leprosy (and three were found in one school last year) are kept in the detention settlement for lepers on Oahu. But it is sad beyond words to see so many young people, boys and girls of 17 and 18. Under the management of the new director there are many new attractive buildings, and the system followed is on the cottage plan. The girls live in a unit directed by the sisters, and the boys in one directed by the brothers, although the conduct of affairs is non-sectarian.

As we near the sisters' unit we see a delightful white house, low and rambling; there is a pergola in front covered with crimson bougainvillæa flaming against the white of the building and the green leaves of trees and shrubs. As we draw near a sister in a white coif and a white gown comes down the steps and out under the pergola. It is a beautiful picture of peace and restfulness. The house is enclosed by a low fence which the "unclean" do not pass. The sisters go to their charges but the homes of the latter are just as pleasing. Each girl has her own room, adorned with her own possessions, all immaculately cared for. Somehow the terrible deformities caused by the disease sink into the background, for all are busy and apparently happy, and the desire to live is just as strong as in the average human being.

The territory supplies everything—medical service, housing,

food, clothing, and a small amount of pocket money. If anyone wishes to work, he or she may do so and be paid regular wages. Each unit has its own kitchen and dining-room and there are many churches, representing all the various sects from Catholic to Mormon. The Japanese have their own services and feast days; so do the Chinese and the Hawaiians and the Filipinos and the Samoans. Most of the work undertaken is agricultural, fishing, chicken raising, or bee culture. There are many recreation centers, and altogether it is about as normal a community as one could possibly find.

There are about 430 patients and 100 staff members. Only about 40 are hospital patients; they are in the worst stages of the disease, but they still smile (if there is a mouth left capable of smiling, or eyes that can see to smile). The doctors, nurses, attendants, and patients are all gracious and gentle. We do not stay long in the hospital, for despite the smiles, the effects of the disease are terrible to behold—how much more to suffer! The patients are not allowed to touch the "clean" but they are always pleased when the few visitors who are allowed come without gloves. All visitors are warned, however, not to touch railings or chairs or utensils used by the patients. Yet there is a history of a man sent to Kalaupapa 32 years ago with this disease. His wife decided to go with him. They have lived ever since in one of the cottages and she has never developed or, indeed, shown any sign of the disease. Just what it is and whence it comes are still mysteries.

We go to the brothers' quarters. Here is a beautiful rock garden abounding with flowers, and high up on the slope a tiny shrine with its sweet-faced Madonna. The old people and the blind prefer to remain in the earlier buildings; when the years are many or the eyes can no longer adjust to new surroundings, familiar things are best. The director has given regard to their wishes, but has joined two houses for the blind with a long lanai (a kind of broad piazza), so that they may walk at ease, if, indeed, walking is possible, for the disease frequently affects the feet. There are devices for occupation and enjoyment, among them a talking-book, but they cling mostly to the things of other days, so one of the young girls is reading aloud.

In the afternoon we drive across the little peninsula to the site of the first leper colony on Molokai. It is a beautiful spot, with Father Damien's chapel and the adjoining churchyard, where he was buried. But recently Belgium requested that his remains be returned to his homeland. The Territory responded to this request although it was felt by many that he would have preferred to rest among those with whom he had lived and worked for so many years. It was in this little

chapel that he stood up the Sunday after he discovered he had contracted the disease and began his exhortations with "We lepers." This side of the peninsula is far more attractive than the present site of the colony, but is much damper and colder, and because of interference with circulation, the leper is hypersensitive to cold. On this July day it is difficult to imagine anything cold, for the heat is so intense it is a comfort to get under the shade of the great trees.

The people of the colony travel all over the peninsula except in the enclosure for the clean; we met a truckload of men and women going on this Saturday afternoon to work at Father Damien's park, a project they have undertaken of their own volition as a labor of love and appreciation, and later saw them when they had built a fire and cooked their lunch. It was just like any other picnic; they were singing and laughing as they ate and worked.

We learned that a few in the colony recover sufficiently to return to their homes, but they almost invariably return within a short time. Those with whom they come in contact fear contagion (although patients are paroled only when the disease is in a non-communicable stage). In other cases the deformity resulting from the disease makes them objects of curiosity or makes it impossible for them to get a job, so, as they say, they "turn homeward toward Kalaupapa"; and we, too, turn homeward, for the plane cannot wait. Here it is on the flying field and we wave "goodbye" to new friends, carrying with us a very different conception from that of our outward journey. We travel westward into the setting sun; Molokai grows smaller in the distance, and the headlands of Oahu rise up against the sunset. We say little, for what is there to say? Here we are over Pearl Harbor; the plane is gradually coming to earth. We take up ordinary life again and perhaps we wonder why we ever complain about so many little things when those others face the tragedy of a living death with a smile.

WINIFRED HATHAWAY

Reading as a Visual Task*

The printed page is read ordinarily without thought of Gutenberg, who invented printing; of Mergenthaler and others who mechanized its production, or of the uncounted designers and typographers who advanced the art by empirical steps. To most readers the printed page appears to be merely a simple reality and the act of reading is so commonplace that it does not even occupy the consciousness. But the foregoing two sentences represent

* Reprinted, with permission, from August, 1938, *Booklist*, published by the American Library Association.

respectively two hidden chains of events which are of great importance to the welfare of readers. Since Gutenberg, civilized human beings have become enslaved by the shackles of near-vision, performing critical seeing of prolonged tasks within arm's reach. Among the countless unnatural, prolonged, critical visual tasks that have been introduced into our artificial world, reading is of universal and overwhelming importance. As such, it is an appropriate subject for research and analysis by modern science. The chain of events from this printed page to the final perception and retention involves a complexity of vision and of seeing. In this chain, and diffusing from it, are many hidden physiological effects involving eyesight, energy, fatigue, and far-reaching effects. Here is a realm of particular interest to the reader because of its intimate relation to human welfare.[1]

Much research has been devoted to reading, but most of it has been handicapped by inadequate criteria and technique, and by inadequate knowledge of what reading is as a visual task and how it is affected by various components. Our researches over a period of a quarter of a century eventually developed a proper concept of seeing as distinguished from vision. Reading was naturally used as a task in many of our researches, with the result that we have achieved a specially intimate and extended view of it as a task, and have revealed various effects of reading which had been previously hidden. Much of this is co-ordinated in a recent volume.[2]

Superficially, reading matter is considered largely from the viewpoint of size, design, and leading of type. In the absence of suitable criteria and devices for easy measurement, typographers have had to rely upon experience and judgment. As a consequence, esthetic considerations have often been too predominant. From the viewpoint of vision it is very important to realize that reading involves prolonged near vision, which is unnatural from the viewpoint of evolution of eyesight and life. Also, in the artificial world in which we live, the level of illumination is unnaturally low from the viewpoint of adaptation to environment outdoors where eyesight and living things evolved. Ordinarily the brightnesses of areas of landscapes which are pleasant to look at outdoors are a hundred times brighter than this printed page where it is commonly read indoors. In addition, it has been adequately proved that the visual sense is most efficient or sensitive at brightness-levels a hundred times higher than the printed pages are when viewed or read in libraries,

[1] Luckiesh, Matthew: *Seeing and Human Welfare*, Baltimore: Williams & Wilkins, 1934.

[2] Luckiesh, Matthew, and Frank K. Moss: *The Science of Seeing*, New York: Van Nostrand, 1937.

offices, and homes. Still, many researches in reading have been prosecuted without any realization of the fact that the illumination of the printed page is just as much of a factor in the visibility of the type as the fixed factors, such as type-size.

After many years of research in seeing we have come to look upon the visual task of reading as one primarily of visibility and ease of reading. The former applies to the reading matter and the latter to the reader. Visibility is affected by the design and size of the type, the contrast between the printed matter and the paper background, the level of illumination, and the environment with its possible distractions. All these affect the readability and the reader by influencing ease of seeing. Thus the visibility of the printed matter is all important in analyzing the visual task, and also becomes very important as an indicator of readability or ease of reading. The Luckiesh-Moss Visibility Meter is now doing service in this respect.

Some idea of the effect of type-size (of a given style) and illumination (measured in foot-candles) is readily gained from the fact that the visibility of 8 point type is equal to that of 12 point type of the same style, provided the former had twice the amount of light on it, that is, was illuminated by twice the foot-candles. This does not necessarily mean that the smaller type, even when raised to the same visibility, is not still more difficult to read than the larger type.[3]

Another interesting comparison may be made of type faces and visibility. Of twenty 8 point type faces studied, the one of lowest visibility had a visibility only two-thirds that of the one of highest visibility. This means that the former had to have nearly three times the illumination of the latter to make it of the same visibility. If the differences in visibility of these so-called 8 point types under the same illumination are expressed in point sizes which would make the two extremes equal in visibility, the one would have to be about 9 point and the other about 7 point.[4] From these glimpses it is seen that there are several variables which can be measured and correlated. Furthermore, it is nothing short of ridiculous for anyone to make a sweeping generalization as to the best type face, type-size, or illumination for reading.

In addition to the foregoing there is the matter of ink, paper, and printing. The same type face may be of much lower visibility if the paper or the printing is poor than if they are of the best quality. For example, the printed matter in a telephone directory was found to require three times the illumination

[3] "How Much Light for Reading?" *Journal of the American Optometric Association*, Vol. 7, 1936, p. 18.

[4] "The Visibility of Various Type-Faces," *Journal of the Franklin Institute*, Vol. 223, 1937, p. 77.

to render it of the same visibility as when well printed on white paper. This is largely due to the decreased contrast in the former case.

This factor is also involved in the use of tinted or colored paper. Any paper with even a slight tint has a lower reflection factor than the best white paper. Therefore, visibility of the printed matter is lower when a tinted paper is used. In an investigation[5] we found no evidence of greater readability or ease of reading for print on yellowish tinted paper when compared with the same print on a white paper. There was definite evidence that readability of the same print on yellow and red papers was measurably less than on white paper. The readability decreased as visibility decreased when the printed matter on the various papers was illuminated to the same foot-candle level.

At this point we might glimpse some of the criteria used. For many years it has been assumed that the rate or speed of reading is an appropriate method of measuring readability or ease of reading. We have shown by many researches extending over various visual tasks that the rate of doing work, such as the number of words or pages read in a given time in the case of reading, is not a reliable measure of ease of reading. This criterion is not sensitive enough to detect differences excepting in rather extreme cases. Readers develop habits and rhythms that do not change appreciably with relatively small differences in the actual visual task. Just as the brain is a taskmaster which demands that the heart do its job under widely different degrees of physical effort, it also demands that the eyes and visual sense do their job whether the visual task is easy or difficult. Within wide limits this is done with the result that reading will be done at nearly the same rate for two cases differing widely in difficulty. But this is done at the expense of the reader.

This led the writer and Frank K. Moss to develop some entirely new approaches, one of which aimed to measure physiological effects of reading and of other seeing tasks. We have measured tenseness, heart-rate, eye-fatigue, and rate of blinking due to reading. Some of these results have been well correlated with visibility measurements, giving an added significance to the latter which can be readily measured by our current technique. On the other hand, psychophysiological researches require many months of tedious work with many subjects.[6] We now have incontrovertible evidence that undesirable physiological effects are increased by factors and conditions which reduce

[5] "Visibility and Readability of Print on White and Tinted Papers," *The Sight-Saving Review*, Vol. 8, 1938, p. 123.

[6] "Reflex Effects from Critical Seeing," *American Journal of Ophthalmology*, Vol. 18, 1935, p. 527.

the visibility of printed matter. This is a much more appropriate approach to the problem of readability and ease of reading than previous methods.

Of all these new criteria, we have studied rate of blinking for the greatest variety of reading tasks. The reflex blink is a phenomenon associated with tenseness and apparently is a relief mechanism. We have found that this criterion distinguishes between the readability of type faces of the same size but differing in design so slightly that no one can determine by mere inspection or qualitative experience which is best. No other criterion has as yet been able to detect such differences in readability of type faces differing only slightly in design. The rate of blinking was found to be closely related to visibility. For example, when reading the type face of highest visibility the rate of blinking was lowest even for type faces of the same size.

The determination of the proper amount of leading generally has not been accomplished by measurement. However, we have found that the rate of blinking appears to be a promising criterion in this aspect of typography. For example, for reading a given 10 point type, the rate of blinking decreased markedly as the leading was increased from 1 point to 3 point. For 6 point leading it was not significantly less than for 3 point leading, indicating that the latter is a practical optimum for that particular 10 point type face.[7]

These are glimpses of the scientific approach to the important subject of reading. Much progress in understanding the subject is imminent. Certainly the science of seeing can make no greater contribution than to reveal the ways in which reading may be made easier, thus conserving eyesight, energy, and other human resources. Doubtless, most readers are not interested in the scientific aspects of the visibility of reading matter and of the complex psychophysiological effects of reading. However, it must be interesting to know that the empirical practices of type-designers, typographers, printers, and publishers are bound to be reinforced or remodeled by results obtained by new criteria, technique, and concepts of seeing. The reader should be aware of the fact that the visibility of printed matter is not merely fixed by the typography—type face, type-size, leading, length of line, paper, and printing.

By increasing the level of illumination, visibility and readability or ease of seeing increase just as definitely, for example, as it the typographer increased the size of type. Most printed matter is read indoors under a few foot-candles. We have definite evidence that readability or ease of reading increases as the

[7] "Effects of Leading on Readability," *Journal of Applied Psychology*, Vol. 22, 1938, p. 140.

illumination is increased up to and beyond 100 foot-candles. This is true for 10 point and 12 point type that can actually be read under a fraction of a foot-candle. Thus light is a factor just as definite in its contribution toward readability as eyeglasses are. In addition to this, the requirements of reading and the age and ability of the reader are important. Proofreading is a far more difficult task than mere reading for the sense or story. All these factors, of which only glimpses can be given in a brief article, constitute a complexity which is unappreciated by those who make generalizations or sweeping statements as to what type size is enough, how much light is enough, etc. Ideal conditions are the result of maximal contributions by all factors and aids to seeing. Only this is "enough." Obviously, costs of various factors must be taken into account but this cannot be done properly without knowing the benefits which these factors can bestow. Somehow we manage to justify the cost when we realize the benefit.

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Note and Comment

Model Eye Safety Record.—An excellent example of what can be done by proper safety measures is the record of the Hawthorne Works of Western Electric Company. In 1924, before safety measures were efficiently carried out, the company had 522 eye injuries causing time loss. In the subsequent years steps were taken to remedy this situation, with the result that the eye injury graph took on the form of a 1929 stock market record, hitting a low of one case in 1934 and no more than three cases in each of the following years.

Preventing Eye Accidents in Switzerland.—Since March, 1933, when systematic measures for the protection of workers' eyes were introduced by the Accident Prevention Service of the Swiss Federal Railways, the number of eye injuries has steadily declined. In 1937 the proportion of eye accidents in the entire workshop department was one for every 100,000 man-hours, as compared with 6.1, on the average, for the years 1929 to 1932.

Prevention of Ophthalmia Neonatorum in Illinois.—With the enactment in 1933 of a law requiring the use of a prophylactic in the eyes of every newborn child in Illinois, the State Department of Public Health made provision for the recording on each birth certificate of the use of such prophylactic. A study of 1937 birth certificates with respect to this record reveals that of 115,283 birth certificates filed, there was no record of a prophylactic application on 2,065; on 41 certificates the attendant reported that no prophylactic was employed; on 1,276 the preparation specified as having been used was not of an approved kind; the information on 1,412 certificates was not sufficient to give satisfactory information on what had been done. Forty-seven cases of ophthalmia neonatorum were reported; fortunately, however, prompt and vigorous treatment prevented the loss of sight in all cases.

Drugs and Cosmetics Act Safeguards Eyes.—The food, drugs, and cosmetics act recently passed by Congress makes the provision that any preparation for hair dye containing coal tar, which may

be injurious to the user, must bear the statement, "Caution: This product contains ingredients which may cause skin irritation on certain individuals, and a preliminary test according to accompanying directions should first be made. This product must not be used for dyeing the eyelashes or eyebrows; to do so may cause blindness."

Ophthalmic Surgery.—Transplantations from the eyes of human corpses always provide good copy for newspaper features, and hence are frequently given a disproportionate share of publicity. According to a recent article in the *American Journal of Ophthalmology*, however, the ideal material, especially for intraocular work, is the eyes of kittens from six to twelve weeks old. Monkey eyes, also are excellent for this purpose, but are too rare and expensive for ordinary purposes.

The possibility of successful surgery in cases of corneal transplantation is only fair, according to Dr. J. W. Tudor Thomas, associate surgeon in charge of the corneoplastic department of the Central London Ophthalmic Hospital. In a study which he has made of 56 operations performed since 1930, 62.5 per cent were successful. The failures were for the most part due to the fact that the eyes were "unfavourable." It is heartening to note, however, that operations performed since 1936 have been successful in 80 per cent of the cases, as a result of improved techniques.

Good Housekeeping for Goggles.—Realizing that goggles kept in tool boxes or bench drawers may become dirty and scratched, the American Optical Company at Southbridge, Mass., has designed flat wooden cabinets for storing goggles. Glass doors keep out dust and dirt. The goggles are hung on partitioned racks inside the cabinet, with each partition bearing the number of a workman. At the end of each working day the goggles are returned to the respective niches in the cabinet. Over the weekend they are thoroughly cleaned. The company has found that a careful scrubbing of the goggles in a hot solution of soap and water will remove dirt and other foreign matter that might cause skin irritations.

Causes of Blindness in England.—The thirty-second annual report of the Northern Counties Association for the Blind in England, presents an analysis of 10,000 cases of blindness, indicating that

6,406 cases were due to congenital or undetermined causes. Primary cataract accounted for more than one-half of such cases, and primary glaucoma, for one-sixth. The number of cases due to infectious and bacterial causes was 1,791, including 405 cases of ophthalmia neonatorum and 492 cases resulting from syphilis. Traumatic and chemical causes numbered 580, including 262 cases of industrial trauma and 286 non-industrial trauma (including 44 results of war injury). General diseases accounted for 800 cases, and no cause was known in 423 cases.

Lost: 1,000 Years!—A total of 313,953 working days was lost in Ohio industries during the year 1937 as a result of 44,876 eye injuries, according to the annual statistical report issued by the Industrial Commission of Ohio. One able-bodied laborer, working six days a week, would have to work over 1,000 years to accomplish the work that was lost through such injuries—many of which could have been prevented!

1939 Drivers See More.—The most important contribution to traffic safety afforded by the 1939 model cars is the greatly increased visibility for the driver. This improved visibility is obtained in two ways. First, glass area has been increased considerably and the width of the corner posts has been reduced. In one important line of bodies, for example, the front window or windshield area has been increased by 32 per cent and the total glass area by 27 per cent. Since a split second's difference in a driver's braking time may often spell the difference between an accident and a near-accident, this increased visibility should do much to cut down the number of accidents.

The Eye Generates Electricity.—The human eye is actually an electrical generator, according to Professor Walter R. Miles of Yale Medical School, who has discovered that the front part of the eye is electrically positive while the retina is electrically negative. Differences in potential, measured during a wide turning of the eyeball, range from .0002 to .003 volts for each eye. One eye may differ markedly from its mate; and minor visual defects seem to make little difference. That the eyeball itself, and not the surrounding muscle, is the source of the current, was demonstrated when the tests were checked on persons who had lost one eye. If

the eyeball is not there, no current is generated, regardless of whether the socket is left empty or filled with a glass eye.

Eye Protection for South African Welding Workers.—In order to protect the eyes of welding workers employed in South African mines, the Prevention of Accidents Committee of the Rand Mutual Assurance Co., Ltd., makes the following recommendations:

1. In Oxy-acetylene Welding.—Adequate protection for the eyes can be provided by using goggles with special light-absorbing lenses. The goggles should make a close fit to the eye sockets all round, so as to avoid rays or sparks entering around the frames. Proper fitting of the goggles is of the utmost importance. Helmets of an approved type are more satisfactory than goggles.

2. In Metallic Electrode Welding.—Approved helmets with light-absorbing glass, of a type which will absorb all ultraviolet radiation and at least 99 per cent of the infra-red. In addition each operator should be surrounded by a screen painted inside with a lead paint of a dark, flat color. Where others than welders are likely to come close to welding operations, their eyes should be protected with goggles.

Marigold Yellow for High Visibility.—Marigold yellow, technically described as 5-yellow-8-12, is recommended as the ideal color for the rear end of trucks, since it contrasts vividly with predominant landscape colors by day and night. A frame of jet black sawteeth provides color contrast against the yellow, as well as line contrast by presenting diagonal rather than horizontal or vertical edges.

British Minister of Health Appoints Advisory Committee on Blindness.—Note has been made of the appointment by the Minister of Health of an Advisory Committee on Blindness, including its prevention and treatment. The committee will carry on the work hitherto performed by the standing committee on the Prevention of Blindness of the Union of Counties Associations for the Blind, which has ceased to exist.

Myopia Increasing among Japanese.—Myopia has increased considerably in Japan during the last 20 years. A study of school children and students from 12 to 18 years of age shows that myopia

has increased from 15.97 per cent to 36.35 per cent among the boys and from 10.4 per cent to 34.56 per cent among the girls.

Changes in Examinations for Ophthalmologists.—The American Board of Ophthalmology announces an important change in its method of examination of candidates for the Board's certificate. The written examination, which will be held simultaneously in various cities throughout the country approximately 60 days prior to the date of the oral examination, will include all of the subjects previously covered by the practical and oral examinations. Oral examinations will be held at the time and place of the meeting of the American Medical Association and of the American Academy of Ophthalmology and Oto-Laryngology, and occasionally in connection with other important medical meetings; the examination will cover the following subjects: external diseases, ophthalmoscopy, pathology, refraction, ocular motility, and practical surgery.

The written examinations in 1939 will be held on March 15 and August 5. Oral examinations will be held in St. Louis on May 15 and in Chicago on October 6. Applications for permission to take the written examination on March 15 must be filed not later than February 15 with the secretary, Dr. John Green, 6830 Waterman Avenue, St. Louis, Mo.

National Society Notes.—As a result of the maintenance of exhibit booths during the annual convention of the American Medical Association in San Francisco last summer, approximately 200 doctors from all parts of the country registered requests for the Society's material and manifested an interest in the Society's work. A similar broad interest was indicated also by the registration for material at the Society's booth at the National Conference of Social Work in Seattle.

The summer course for sight-saving class teachers conducted by Mrs. Winifred Hathaway, associate director, at the University of Hawaii in Honolulu, prepared 24 teachers for this special work in Hawaii as well as in other parts of the United States. Mrs. Hathaway also visited seven islands in the Territory of Hawaii, where she made a survey of the work in sight conservation which has been carried on since her 1932 visit. The Forum section of this issue of the REVIEW includes one of the letters which she sent from Hawaii, vividly describing one day's activities there.

Returning from Hawaii in August, Mrs. Hathaway stopped in San Francisco to study the sight-saving class work. During the fall months she has made field trips to Asheville, N. C.; Detroit, Mich.; Bethlehem, Pa.; and Washington, D. C., where she held conferences and took part in general meetings and institutes.

Lectures at summer courses for sight-saving class teachers were delivered by Mr. Lewis H. Carris, managing director, at several universities, including the University of Washington, Tulane University, University of Cincinnati, Wayne University, and New York State Teachers College at Buffalo. Mr. Carris also took part in the course on "Eye Health of the School Child," conducted at the University of California, in Berkeley, by Dr. Anette M. Phelan, associate in health education. During the fall Mr. Carris made two visits to Tennessee to help in the formulation of the state program for the prevention of blindness. He offered similar assistance in South Carolina, where a division of the social welfare board is charged with conservation of vision responsibilities.

During the early fall Dr. Phelan carried on her work with the Eye Health Committee of the American Student Health Association and its advisory committee of ophthalmologists. Since her marriage to Dr. William F. Watson in October, she has continued this work on a part-time basis.

At the request of the Ohio State Commission for the Blind, Miss C. Edith Kerby, statistician, spent two weeks in Ohio during September, where she revised the statistical reports of the prevention of blindness service of the commission.

During the summer and fall Miss Eleanor W. Mumford, R.N., associate for nursing activities, assisted in institutes for nurses in Chicago, Ill.; Denver, Colo.; Trenton, N. J.; and New Brunswick, N. J. In addition she participated in conferences on eye health in Hackensack, N. J.; Washington, D. C.; Greenwich, Conn.; Wilmington, Del.; and Philadelphia, Pa.

The Society has announced the appointment of a Nursing Advisory Committee, headed by Miss Katharine Tucker, professor of public health nursing in the School of Education, University of Pennsylvania. The Committee has been selected to represent the various fields in nursing, such as nursing education—graduate and undergraduate—and public health nursing in its many phases.

Each of the federal nursing services is represented by its director. In addition to Miss Tucker, the Committee includes: Miss Josephine McLeod, secretary-treasurer of the Virginia State Board of Examiners of Nurses, Richmond, Va.; Miss Ruth Sleeper, assistant principal, School of Nursing, Massachusetts General Hospital, Boston, Mass.; Miss Cora Shaw, Institute of Ophthalmology, Presbyterian Hospital, New York, N. Y.; Miss Naomi Deutsch, director of public health nursing, Children's Bureau, Washington, D. C.; Miss Pearl McIver, senior public health nursing consultant, United States Public Health Service, Washington, D. C.; Miss Elinor D. Gregg, director of nursing, Office of Indian Affairs, Washington, D. C.; Miss Mary B. Hulsizer, instructor in school hygiene, Board of Education, Newark, N. J.; and Miss Marguerite Wales, consultant in nursing education, W. K. Kellogg Foundation, Battle Creek, Mich.

The recent appointment of Dr. J. Warren Bell as medical director will enable the Society to co-operate more extensively with the medical profession and with local, state, and national health departments and associations. Dr. Bell, who holds the degrees of B.S., M.D., and Ph.D. from the University of Minnesota, was formerly director of Maternal and Child Health in Nebraska, and prior to that was director of the Division of Maternal and Child Health in Cattaraugus County, New York. Since his appointment in October, Dr. Bell has established relationships with professional and lay organizations, both personally and through correspondence. He has represented the Society at the annual meeting of the American Public Health Association in Kansas City, at the Conference on Health Education of the National Education Association, at the Kips Bay-Yorkville Health Center meeting, and at a conference on syphilis and gonorrhea at the New York City Board of Health.

Effective January 1, 1939, Mr. Carris will become general director of the Society, Mrs. Hathaway will continue as associate director, and Mrs. Eleanor Brown Merrill will assume the title of executive director. Mrs. Merrill's activities during the fall included participation in conferences with the Vermont Association for the Blind and the Vermont Public Welfare Department in the formulation of a co-ordinated program of prevention of blindness which may be carried out through the joint activities of these and other state agencies.

Current Articles of Interest

Nature of the Filtrable Agent of Trachoma, Phillips Thygeson, M.D., and Polk Richards, M.D., *Archives of Ophthalmology*, October, 1938, published monthly by the American Medical Association, Chicago, Ill. The authors performed 22 filtration experiments on human volunteers, monkeys, and baboons. Maximal activity of the trachomatous material was attained in five of the six successful experiments by using pooled epithelial scrapings from trachomatous Indian children. For the sixth experiment the material was obtained from an adult white person with acute trachoma. The material yielding active filtrates contained substantial numbers of epithelial cell inclusions. On the basis of the observations it is believed that the elementary bodies of trachoma are virus bodies, like those of psittacosis and inclusion blennorrhea, and that they are similar, except in staining reactions, to typical virus elementary bodies. Belief that the elementary body of trachoma represents the morphologic unit of the virus of trachoma rests principally on the following observations: (1) the identity in morphologic structure and staining reactions of the bodies of trachoma with the similar bodies of inclusion blennorrhea and psittacosis, established virus diseases; (2) the presence of the elementary bodies in the lesions of trachoma with sufficient constancy to indicate etiologic significance; (3) the presence of elementary bodies in an infective filtrate; (4) their multiplication in new hosts when transferred directly or after filtration; and (5) their persistence in the lesions of trachoma throughout its period of activity. The authors conclude that the elementary body of trachoma has the essential properties of a virus and should be classified, for the present at least, as a filtrable virus.

Accessory Factors in Refraction, Lawrence T. Post, M.D., F.A.C.S., *Guildcraft*, June–July, 1938, published bi-monthly by the Guild of Prescription Opticians of America, Philadelphia, Pa. A presentation of the many problems in refraction which may be encountered by the ophthalmologist. Cases cited include that of a

man with a 20/20 vision in his right eye and a 20/30 vision in his left eye when the eyes were used separately, whereas his vision for both eyes used together was only 20/150, indicating a tremendous convergence effort to overcome exophoria. Had the ophthalmologist neglected to test the vision with both eyes together, this essential factor might have been overlooked. Another interesting case was that of the shoe clerk who required bifocals with small segments at the top of the lenses, so that he could read box numbers on shelves above his head.

Since the ophthalmologist must take into consideration such individual peculiarities as these in addition to the factors of age, occupation, and general health, his task in prescribing lenses is by no means simple and demands an extensive background of medical training and practical experience.

Sight-Saving Classes, M. E. Smukler, M.D., *The Pennsylvania Medical Journal*, October, 1938, published monthly by the Medical Society of the State of Pennsylvania, Harrisburg, Pa. This study deals specifically with children who were referred to sight-saving classes by the Philadelphia Board of Health Eye Dispensary, and presents tables analyzing the groups of students according to the eye difficulty, sex, age, race, etc. The author particularly stresses the social and economic values of sight-saving class work.

Caustic Burns of the Eye, W. B. Hubbard, M.D., *Archives of Ophthalmology*, June, 1938, published monthly by the American Medical Association, Chicago, Ill. In recommending treatment for burns of the eye, the author suggests the free use of water and weak acids as emergency treatment; the use of an alkaline neutralizing fluid is to be avoided. For after-treatment, weak acids are valuable, particularly tannic acid. When tannic acid is used, antiseptics, such as methyl rosaniline and silver nitrate, should be used also. Agents such as atropine and compresses should be used according to the indications.

Sulfanilamide Treatment of Trachoma, Fred Loe, M.D., *Journal* of the American Medical Association, October 8, 1938, published weekly by the American Medical Association, Chicago, Ill. A

daily dose of one-fourth grain of sulfanilamide per pound of body weight was used on 140 patients at the Rosebud Indian Hospital in South Dakota, with the following results:

1. Improvement of subjective symptoms: (a) cessation of lacrimation within 24 hours; (b) loss of photophobia within 24 hours; (c) improvement of vision within 72 hours in cases of pannus.

2. Improvement of objective symptoms: (a) paling of the conjunctiva; (b) paling of the trachomatous patches and flattening of the granules and follicles; (c) resuming of the normal velvety texture of the conjunctiva at the end of two months, in cases where there had been no scarring from instrumentation; (d) greater visibility of the blood vessels of the conjunctiva after the fifth or sixth day of treatment; (e) in 30 cases of pannus, clearing of the opacity between the eighth and the fifteenth day; (f) disappearance of the granules on the lower lids.

The Ultraviolet Ray as an Eye Hazard, Van D. Rathgeber, M.D., *Texas State Journal of Medicine*, October, 1938, published monthly by the State Medical Association of Texas, Fort Worth, Texas. After surveying the literature in the field, the author comes to the following conclusions: 1. The changes found in the anterior segment of an eye following exposure to bright light are generally recognized as being due to the ultraviolet rays. 2. Changes may be brought about in the lens by both ultraviolet and infra-red rays. 3. The media of the eye, for the most part, absorb the ultraviolet and infra-red rays so that changes in the retina and choroid are attributed to the visible rays. 4. A case is reported to call attention to the disastrous results that followed exposure of an eye to the rays from an electric welding arc. The lesions manifested were typical of those produced in an eye by exposure to ultraviolet rays.

Reading Difficulties in Children, George E. Berner, M.D., and Dorothy E. Berner, B.S., *Archives of Ophthalmology*, November, 1938, published monthly by the American Medical Association, Chicago, Ill. A consideration of reading difficulties which may occur in normally intelligent children with a normal social and vocabulary development. Among the points discussed are visual immaturity, low hypermetropia, deficient fusion, and deficient fusional

convergence. Methods of correction include careful refraction and orthoptic training, as well as training in the actual process of reading under the guidance of a skilled teacher.

Changes in the Types of Visual Refractive Errors of Children: A Statistical Study, Antonio Ciocco, *Public Health Reports*, September 2, 1938, published weekly by the United States Treasury Department, Washington, D. C. This study, which is one of a series prepared for the United States Public Health Service, reveals the following results in retinoscopic examination of 1,481 white school children of Washington, D. C., who were re-examined after an average interval of 28.5 months:

1. The frequency of simple hyperopia was reduced by almost 20 per cent while that of astigmatism (hyperopic and myopic) increased by about 40 per cent, and of simple myopia by about 70 per cent.

2. Over 75 per cent of the eyes with any of the main types of refractive errors remained unchanged during the stated interval. When changes did occur, the non-astigmatic conditions (simple myopia and hyperopia) were transformed to astigmatism, while the astigmatism changed back to the simple refractive errors.

3. The chances of a change in type of refractive error appeared to decrease with increase in the age of the children.

4. The age specific incidence rate of myopia (simple and astigmatic) was highest for the children 10–11 years old at the first examination and was lowest for the children of 14 years and over. With regard to astigmatism (all forms), the age specific incidence was highest for the children 6–7 and 12–13 years old. The lowest incidence of new cases of astigmatism was also found among the children of 14 years and over.

Glaucoma: Classification, Causes, and Surgical Control, Otto Barkan, M.D., *American Journal of Ophthalmology*, October, 1938, published monthly by the Ophthalmic Publishing Company, St. Louis, Mo. In this article, which is one of a series, the author describes shallow-chamber glaucoma and reports a surgical procedure for its relief. The object of the procedure is to reduce increased intraocular pressure in a rational and safe manner by relieving the

mechanical obstruction which is its cause and restoring the physiological direction of outflow of intraocular fluid. The procedure consists of performing one to several excisions of the root of the iris (multiple sublimbal or peripheral iridectomies) in such manner that postoperative adhesions of the iris in the angle are prevented. The technique combines (1) deepening of the anterior chamber by means of physiological saline before, during, and at the end of the operation, (2) posterior sclerotomy, and occasionally aspiration of 0.5 c.c. of vitreous in order to facilitate the deepening of the anterior chamber, (3) performance of one or several successive oblique valve-like keratome incisions within corneal tissue near the limbus, (4) excision of one or several pieces of the root of the iris. Biomicroscopic examination shows the result of the procedure to be a posterior displacement of the diaphragm of the iris within the region of operation, deepening of the chamber with widening of the angle, and subsequent increased access of aqueous to the filtration angle. The effect is to reduce and prevent increased intraocular pressure in shallow-chamber glaucoma.

Binocular Vision and Orthoptic Procedure, Dorothy J. Shaad, Ph.D., *Archives of Ophthalmology*, September, 1938, published monthly by the American Medical Association, Chicago, Ill. Binocular vision is of relatively recent development in the evolutionary scale and is based on complex neurologic relations. Although the essentials for binocular vision can be isolated, the exact basis for the production and maintenance of fusion remains in the realm of theory. Clinical analysis of the anomalies of binocular vision which are associated with imbalance of the ocular muscles frequently reveals significant functional changes, including defects of the visual field (suppression scotomas), amblyopia ex anopsia, and anomalous projection. Orthoptic procedure implies the application of measures designed to correct these defects and to promote normal coordination of the ocular muscles through the training of fusional ductions. If such treatment is to be established as a routine therapeutic measure in the treatment of strabismus, the value of its contribution depends on the proper testing of binocular vision, adequate records, and careful control of other factors, such as correction of refractive errors, which form a part of the general treatment.

Book Reviews

INTRODUCTION TO PHYSIOLOGICAL OPTICS. James P. C. Southall. New York: Oxford University Press, 1937. 426 p. ill.

The works of Southall are always of particular interest to the ophthalmologist and the present volume is no exception. While there is no pretense at completeness and no effort to cover the entire field, the volume is nevertheless useful. It seems to be directed particularly to those readers who are not of the medical profession, but whose interest in psychology or optometry demands instruction in certain fields of physiological optics.

—JOHN N. EVANS, M.D.

AN INTRODUCTION TO CLINICAL PERIMETRY, Third edition. Harry M. Traquair, M.D. St. Louis: C. V. Mosby Co., 1938. 320 p. ill.

To one who has reviewed every edition of Traquair as it has come from the press it is truly a pleasure to have the opportunity of studying the present edition. The work is certainly a milestone in the progress of ophthalmology and has presented for us each secure phase of perimetry as it has evolved to real clinical usefulness. One is continually impressed with the orderly arrangement and logical sequence, with the easy style and convincing manner of the writer. The tremendous advantage of the so-called quantitative method of visual field study is well illustrated. The foreword by Dott stresses the important place which perimetry assumes as a diagnostic aid to the neurologist. Traquair has added many helpful illustrations and has inserted more detail on the anatomy of the pathway.

—JOHN N. EVANS, M.D.

DYNAMICS IN BINOCULAR DEPTH PERCEPTION. Heinz Werner, Ph.D. Columbus: Psychological Review, 1937. 127 p. ill.

This monograph should be consulted by everyone interested in depth perception, fusion, or in fact any aspect of visual physiology or psychology. The study is a technical report giving details of experiments performed in the Psychological Laboratory of the University of Michigan.

It is divided into five parts as follows: displacement and depth in half-images; displacement and depth in the Panum-pattern; depth and displacement in strobostereoscopic vision; displacement and depth in fragmentary binocular vision; displacement and the dynamics of the binocular field.

The report is technical and not designed for the beginner. It is rather heavy for the ophthalmologist, but to one particularly interested, presents much material which has a practical application.

—JOHN N. EVANS, M.D.

NURSING—AN ART AND A SCIENCE. Margaret A. Tracy, R.N., and Collaborators. St. Louis: C. V. Mosby Co., 1938. 560 p. ill.

As stated by Annie W. Goodrich in her foreword, "This textbook represents the combined consideration of the faculty of a school of nursing (and is in accord) with the scientific and educational concepts of the day."

As the title implies, nursing is presented here as an art and a science. This is as it should be, for the greatest need of nurses today is for increasing scientific information upon which to base practices in the development of the art.

In the field of eye health, we could wish that this presentation of scientific facts had carried further. If the placing of the bed so that the patient "can enjoy the effects of the sunshine without the discomfort of having the light directly in his face is one of the nurse's responsibilities," she needs to know the source of that discomfort.

Also, in the page devoted to prevention of blindness, we find general and optimistic statements of the progress made in this field through (a) "widespread prenatal care [which] has prevented infection of the baby's eyes in the birth canal from gonococcus and lessened the number of babies born with the defective eyesight of the syphilitic; (b) better examination of the eyes of school children [which] has resulted in the detection and early correction of conditions which, if untreated, might result in serious impairment of vision and consequent retardation; (c) sight-saving classes, better lighting facilities in the school and in the home, as well as improved teaching methods and aids [which] have done much to safeguard the eyes during the critical school years."

These optimistic statements provide little on which the nurse can evaluate a program for the prevention of blindness unless she has received other information which will give her the scientific bases for these programs. The implication seems to be that prenatal care and the use of silver salts in the eyes of the newborn are the major part of the program in prevention of blindness.

Reference is made to the nursing care in acute communicable diseases but not to the close relationship between general health and eye health nor to the fact that many systemic diseases have ocular manifestations and the significance of this fact in planning nursing care.

Treatments for eye conditions as presented include irrigations, instillation of drops, instillation of ointments, and hot and cold applications.

Testing for visual acuity is stated to be the frequent responsibility of the nurse and reference is made to the publication of the National Society for the Prevention of Blindness, "Conserving the Sight of School Children." Again the implication is that this work is done largely for school children and no mention is made of the importance of preschool vision testing.

It is to be hoped that a later edition will remedy these oversights and will integrate eye health throughout all nursing procedures.

—ELEANOR W. MUMFORD, R.N.

Briefer Comments

READING AIDS THROUGH THE GRADES. David H. Russell, Etta E. Karp, and Edward I. Kelly. New York: Bureau of Publications, Teachers College, Columbia University, 1938. 90 p.

Although this manual of reading aids is intended primarily for remedial reading, many of the suggestions will be found helpful in the general teaching of the subject, and may prove of assistance in the more important phase of teaching—that of preventing difficulties in reading.

The devices are graded according to the actual grade status of pupils and according to the reading grade of retarded pupils.

Difficulties inherent in the child include low intelligence, immaturity, physical disabilities, and temperamental and personality factors. Difficulties in environment include such factors as speak-

ing a foreign language in the home; unhappy associations; background lacking in materials; and irregular school attendance or attendance at a number of schools. Additional difficulties are defects in the school program, such as failure to give physical and mental examinations; lack of stimulating material; attempting to teach reading to large groups instead of to individuals; failure to detect and correct mistakes as they occur; and failure to give sufficient guidance and to make reading an intrinsic part of other activities.

PUBLIC WELFARE IN TRANSITION. New York: Department of Public Welfare, 1937. 132 p. ill.

The New York City Department of Public Welfare presents its 1937 annual report in this attractive pamphlet, which is particularly noteworthy for the effective combination of appealing pictures and excellently organized editorial content.

TRAMPING TO FAILURE. Thomas Hall Shastid, M.D. Ann Arbor: George Wahr, Publisher, 1937. 504 p. ill.

The life story of a many-sided man who "tramped" along the bypaths of learning in a loose, rambling way and arrived at a richer success than he would ever have attained by taking the smoothly paved highroad.

OCCUPATIONAL EXPERIENCES FOR HANDICAPPED ADOLESCENTS IN DAY SCHOOLS. Elise H. Martens. Washington: United States Department of the Interior, Office of Education, 1938. 62 p. ill.

A consideration of the vocational training of the handicapped, based on a study of what is actually being done in a selected group of cities. The sections on the specific problems of the visually handicapped are particularly valuable for teachers of sight-saving classes.

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

280. Prevention of Blindness from the Ophthalmologist's Point of View, Ellice M. Alger, M.D. 12 p. 10 cts. A history of the sight conservation movement from ancient times to the present day, told from the medical and sociological viewpoints.

281. Senile Cataract, Purman Dorman, M.D. 8 p. 5 cts. In simple and vivid language the author describes the development of cataract, and indicates methods of treatment.

282. Eye Health in Teacher Education. 8 p. 5 cts. Analysis of the present situation, together with recommendations of the Advisory Committee on Teacher Education, for the National Society for the Prevention of Blindness.

283. When Shadows Fall, E. K. Smith. 12 p. 10 cts. A moving account of the emotions of a cataract victim before and after a successful operation.

284. Vocational Guidance for Sight-Saving Classes, Marie C. Kniewel. 8 p. 5 cts. The author emphasizes the need for giving sight-saving class pupils the widest possible range of vocational choice.

285. A Word to the Wise—About Eyes, Booth Tarkington. 2 p. 5 cts. A well-known writer warns a young boy that the eye is a delicate object and must be safeguarded from injury in play.

Contributors to This Issue

Dr. Ellice M. Alger is a professor of ophthalmology at the New York Post-Graduate Medical School in New York City and a member of the Society's Board of Directors.

Dr. Purman Dorman, a practising ophthalmologist in Seattle, Wash., is a member of the Society's advisory committee, and is the supervising ophthalmologist of the Washington Department of Social Security.

E. K. Smith is a fictitious name assumed by a New York lawyer, who describes his experiences as a victim of cataract.

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Let There Be Sight!

THE National Society for the Prevention of Blindness is an incorporated lay organization engaged in a program of eliminating preventable loss of sight by:

1. Advocating adequate prenatal care for every expectant mother, including a blood test and treatment when necessary, as the first steps in the program of preventing blindness from prenatal syphilis.
2. Urging the need for the universal use of prophylactic drops at birth to protect babies' eyes from infection.
3. Demonstrating an approved method of testing the vision of preschool children in order to discover those who will benefit from early treatment.
4. Co-operating with educational authorities in:
   a. Conserving the vision of school and college students.
   b. Establishing sight-saving classes for children whose vision is so defective that they cannot profitably use ordinary school equipment.
   c. Providing specialized training for teachers of sight-saving classes.
   d. Helping student-teachers secure better preparation for meeting the eye-health problems of school children.
5. Assisting nurses to become increasingly aware of their opportunities for saving sight and aiding in their preparation for this work.
6. Collaborating with those who are striving to reduce eye injuries and eyestrain in industry.
7. Demonstrating the value of specially trained medical social workers in eye hospitals and clinics and helping such workers to secure specialized training.
8. Stimulating and sponsoring research in relation to the causes of blindness and impaired vision.
9. Providing the public with information concerning the care and use of the eyes.
10. Serving as a clearing-house on all matters pertaining to the prevention of blindness and the conservation of vision.

Publications, exhibits, films, lantern slides, lectures, charts, and assistance in sight-saving projects are available on request.

Associate Membership, $50–$100 Subscribing Membership, $5
Sustaining Membership, $10–$50 Contributing Membership, $2

The Society is supported entirely by contributions, membership dues, legacies and bequests.

Donations in any amount are needed and will be gratefully received.

NATIONAL SOCIETY FOR THE PREVENTION OF BLINDNESS, INC.

50 West 50th Street, New York, N. Y.

NATIONAL-SOCIETY FOR THE
PREVENTION OF BLINDNESS